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MAR 27 1918

Automobile Dealer and Repairer

for T. P. & Mech.
860973

A JOURNAL OF PRACTICAL MOTORING

THE MOTOR VEHICLE PUBLISHING CO. 71-73 Murray Street—New York

Vol. 25, No. 1 NEW YORK, MARCH, 1918 Monthly, $1.00 per year Single Copy 10 Cents

JOHNSON'S RADIATOR CEMENT

THE easiest and quickest way of repairing leaks in radiators, pumps, water jackets, hose connections, etc., is to use Johnson's Radiator Cement.

No mechanical experience is required—all you have to do is remove the cap and pour the liquid into the radiator. This will stop the leak instantly without laying up the car.

Quick—Efficient—Harmless

Johnson's Radiator Cement blends perfectly with the water until it reaches the leaks—just as soon as it comes in contact with the air it forms a hard, tough, pressure-resisting substance which is insoluble in water and consequently makes a permanent seal.

Johnson's Radiator Cement contains nothing which can coat or clog the cooling system. It will seal leaks in from two to ten minutes.

Quarts $1.75 Pints $1.00 Half-pints 65c

If your dealer cannot supply you, send us $1.00 and we will forward you a pint all charges prepaid.

Write for our folder on *"Keeping Your Car Young"*—it's free.

S. C. JOHNSON & SON

Dept. A. D. R. 3 Racine, Wis.



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ATTENTION

To Dealers in and Users of Brake Lining for Automobiles and Belting

IN the case of The Scandinavia Belting Company, Plaintiff, against the Asbestos & Rubber Works of America, Inc., of New York City, Defendant, the District Court of the United States for the Southern District of New York has recently entered an injunction in our favor enjoining the Defendant, the Asbestos & Rubber Works of America, Inc., from selling or offering for sale belting or brake lining, not of Plaintiff's manufacture, under the names or designations Scandinavian Woven Lining, Ford Scandinavian Woven Lining, Ford Scandinavian Brake Lining, Scandinavian Weave, Scandinavian Type, Scandinavian and the abbreviated form of the word Scandinavian, to-wit, Scand., or under any word or words of like import.

We take this opportunity to again warn the public from buying or selling any belting or brake lining not of our production under any of the foregoing names.

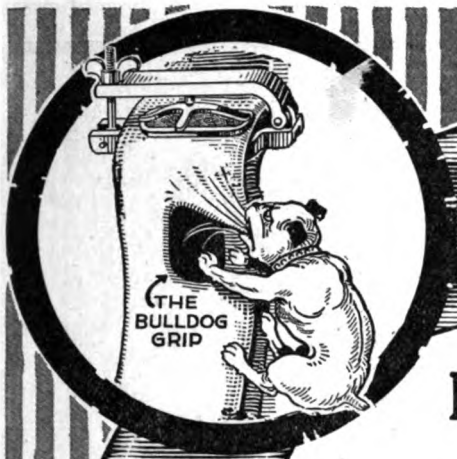
THE SCANDINAVIA BELTING CO.

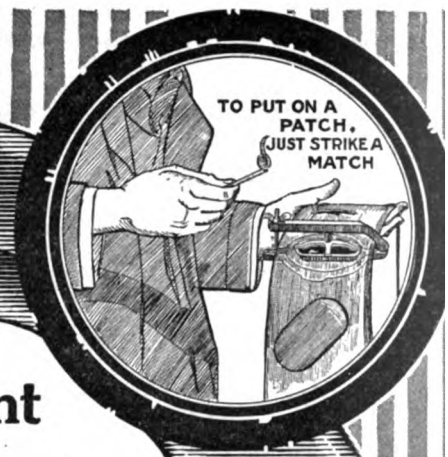
106-108 READE STREET, NEW YORK CITY.

NEW YORK

Boston Cleveland Easton Pittsburgh Chicago
Atlanta San Francisco Los Angeles Portland (Oregon)

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Move to the Front

BECOME A

Super-Vulcanizer Dealer

Reap the Benefit of our advertising—

SUPER-VULCANIZERS WILL INCREASE YOUR SALES

Our Silent Salesman, Window Display and other selling help, coupled with our 1918 National Advertising, is the biggest Sales Campaign ever put behind any tire repair accessory. Will keep your cash register working overtime.

LIFTS THE IRK FROM PUNCTURE WORK

Patches welded with **Super-Vulcanizers in Five Minutes**—become part of the tube; no flame to burn the tube or blow out in the wind; no gasoline, acid or cement. Anyone can operate anywhere, anytime; everyone an expert.

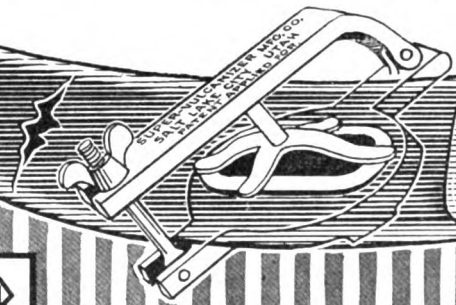
The Super-Vulcanizer has stood every test. We have reached the perfection in the manufacture of our own especially prepared **Super-Vulcanizer Patch.**

Perfect repair in five minutes; every patch is completely assembled in itself; nothing to fix; all you need is a match, you have our absolute guarantee that **Super-Vulcanizer Patches** will cure in **Five Minutes** and will not overcure under any circumstances. Don't overlook this guarantee.

Outfit complete consists of one metal clamp with twelve Prepared Patches and a piece of sandpaper neatly boxed in very attractive carton.

Stock **Super-Vulcanizers, we will sell them for you.** We will not permit **Super-Vulcanizers** to remain on your shelves.

ORDER FROM YOUR JOBBER TODAY



FIVE MINUTE SUPER-VULCANIZER TRADE MARK



FIVE MINUTE SUPER-VULCANIZER TRADE MARK

SUPER-VULCANIZER MFG. CO.

SALT LAKE CITY, U. S. A.

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SUNDERMAN
Vacuum Carburetor

$6

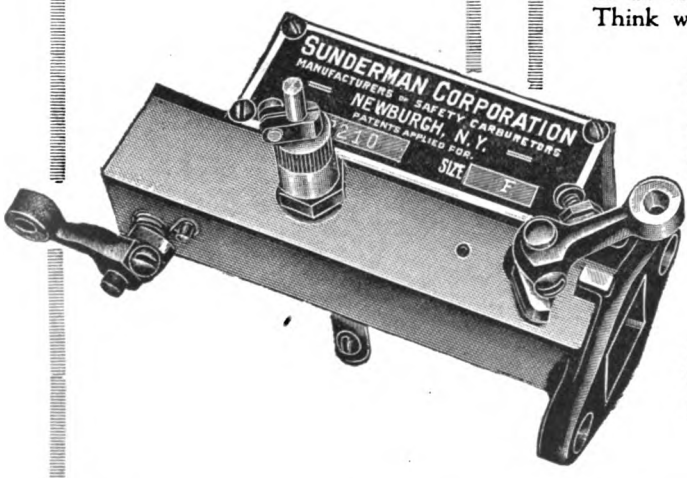
F. O. B.
Newburgh

$8 and $10 for other than FORD or METZ

Help Your Customers to Save

That's your duty, Mr. Dealer. Every Car owner wants to save – you must show them how. The SUNDERMAN CARBURETOR will save for them without sacrificing anything.

Start NOW



Install a Sunderman When You Overhaul Your Car

With the first breath of the spring breeze every owner begins to figure on putting his car in good shape for the new season.

By all means do so this year, Mr. Motorist. New cars will be scarcer than last year and you'll have to do more yourself with the old car to make it run sweetly.

A Sunderman Carburetor Will Do Wonders for You

When you scrape the carbon out of your cylinders, grind the valves and put in new piston rings, **finish the job—install a Sunderman Carburetor.**

Then you will get the final answer to complete motor enjoyment with absolute economy.

More Power at a Lower Cost— More Speed on Less Gasoline

The Sunderman Carburetor works on the soundest scientific principle — that of breaking up the gasoline globules into infinitely minute particles, thus releasing the power that is bound up in coarser mixtures and lost in the combustion chamber.

The low and high speed jets insure an economical but always adequate supply of quickly explosible gas, governed by the suction of the cylinders.

The result is a saving of from 30 to 50% of gasoline in all motors — a power increase of from 42 to 100%. Think what this means in these days of high prices.

As a by-product you get a greater flexibility— a more rapid acceleration — quicker pick-up — better idling, and an Herculean hill-climbing power that in itself is worth more than the purchase price.

Owners—Ask Your Dealer or Order From Us To-day

Dealers—*We'd much rather have YOU take these profits—Write us, and we'll show you how to cash in on our advertising.*

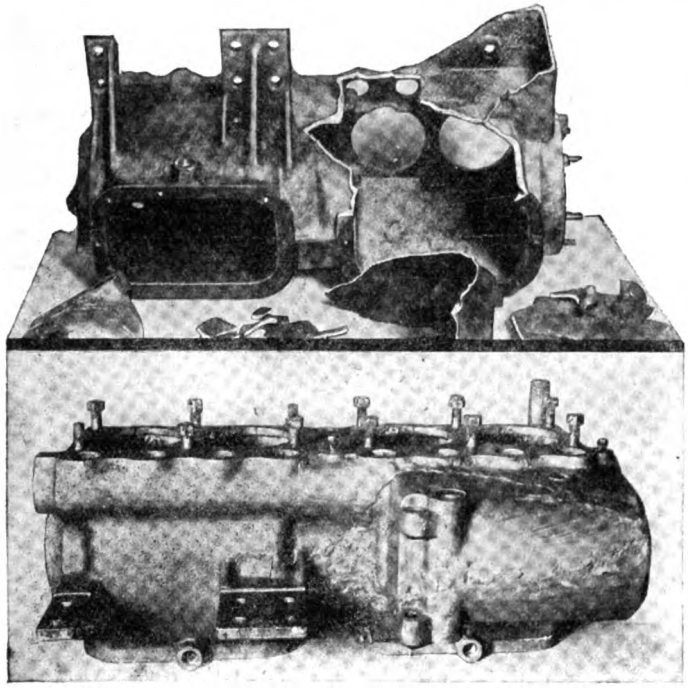
Sunderman Corporation

13 Chambers Street, Newburgh, N. Y.

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IMPERIAL WELDING CUTTING EQUIPMENT
OXY-ACETYLENE·OXY-HYDROGEN

Build Business Through Thrift of Auto Owners



Before and after being repaired by use of Imperial Cutting and Welding Equipment

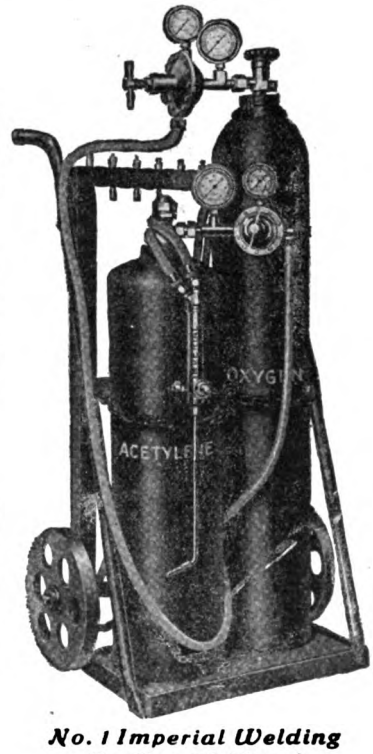
With such an increasing percentage of old cars being overhauled and repaired this year, as a conservation measure, 1918 promises greater opportunities than ever for substantial profits in automobile repair work.

It's up to you to have the best-equipped garage or repair shop in your territory, in order to handle the big jobs. It's practically impossible, any more, to get along without such safe, economical, efficient welding and cutting facilities as are provided by

IMPERIAL WELDING AND CUTTING EQUIPMENT

In the shop or on the road, Imperial Equipment quickly welds broken axles, cracked cylinders, transmission cases, in fact all metal parts. Cuts all steel and wrought iron and decarbonizes cylinders more thoroughly than by any other method.

An Imperial Outfit will quickly pay for itself through added volume of repair business it makes possible. Convenient, and **always ready for use,** it is indispensable as a part of the tool equipment of every up-to-date garage. Write today for the new free catalog, containing complete information of value to you.



No. 1 Imperial Welding Outfit with Truck

A Good Jobbers' Proposition

Jobbers alive to 1918 business possibilities in the auto-repair field, should get in communication with us at once. It will pay you to further the distribution, not only of Imperial Cutting and Welding Outfits and supplies, but of other high grade Accessories, such as Imperial Compression Couplings, Gasoline Cocks, Strainers, etc.

WRITE TODAY!

THE IMPERIAL BRASS MFG. CO.
520 S. Racine Ave. CHICAGO, ILL.

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The MUNGER "ALWAYS TIGHT" PISTON RING OUTFIT—
8 Always Tight Rings
4 Always Tight Rings
1 Regrooving Tool
1 Ring Insertion Tool

MUNGER "Always Tight" Piston Rings





Ready to insert the Munger Re-grooving Tool to true-up a worn piston groove.



The Munger Re-grooving Tool in position for cutting. Testing width of groove with an over-width ring.



A Munger "Always Tight" Piston Ring being slipped over the Munger Ring Insertion Tool.



Showing how easily Munger "Always Tight" Piston Rings can be placed in the piston grooves with Munger Ring Insertion Tool.

List price for all sizes up to 3¾ in. diameter, $1.25 per ring.

With each complete outfit of rings, a *Munger Piston Re-grooving Tool* and a *Munger Ring Insertion Tool* are supplied without extra charge.

Put more pep into your engine!

Get the full impulse out of every drop of gasoline.

Munger "Always Tight" Piston Rings permit no loss of power. They hold compression until completely worn out.

By a patent process of peening they are made to conform to the shape of the cylinder, and this with the Munger "Always Tight" Expansion Joint makes them permanently gas-tight. Gas cannot waste over, under, or through them.

Munger "Always Tight" Piston Rings are the easiest of all rings to install. Slip them over the Munger Ring Insertion Tool (included with each complete outfit) and they slide into the grooves without breakage or trouble of any kind.

With each complete outfit of Munger "Always Tight" Piston Rings is one *over-width* ring for each piston (to be used in worn grooves) and a Munger Re-grooving Tool with which worn grooves can be straightened quickly and accurately without resorting to expensive lathe work, and without even disconnecting the piston from the connecting rod. This is a big saving for both the repairman and the car owner.

SPLITDORF ELECTRICAL CO.
Newark, New Jersey

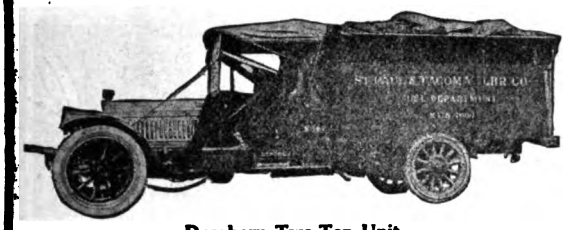
Splitdorf Branch Houses and Service Stations:

Atlanta, 10-12 E. Harris St.
Boston.....68 Brookline Ave.
Chicago..... 64 E. 14th St.
Dallas..... 402 S. Ervay St.
Detroit, 1295 Woodward Av.
Kansas City, 1827 Grand Av.
Los Angeles, 1215 S. Hope St.
Minneapolis, 816 Hennepin Ave.
Newark.....278 Halsey St.
New York.....7 West 61st St.
Philadelphia.....210 N. 13th St.
Pittsburgh...5943 Ellsworth Ave.
San Francisco.....1022 Geary St.
Seattle.....1628 Broadway
Toronto.....469 Yonge St.



The MUNGER "Always Tight" expansion joint

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Dearborn Two-Ton Unit attached to Packard Chassis

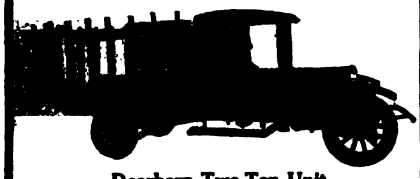


Dearborn Two-Ton Unit attached to Buick Chassis



Dearborn Two-Ton Unit attached to Hudson Chassis

DEARBORN UNIVERSAL TRUCK UNITS



Dearborn Two-Ton Unit Attached to Westcott Chassis



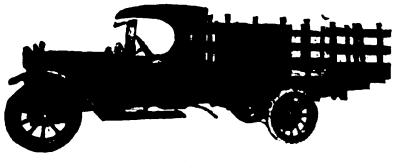
Dearborn One-Ton Unit attached to Dodge Chassis



Dearborn Two-Ton Unit attached to Pratt-Elkhart Chassis



Dearborn One-Ton Unit attached to Oakland Chassis



Dearborn One-Ton Unit attached to Hupmobile Chassis

Dealers—Sell the Unit That Fits Every Car

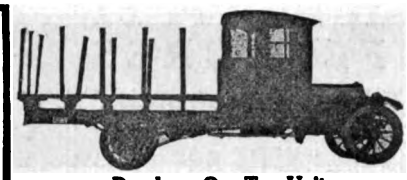
With Dearborn Universal Truck Units you are no longer confined exclusively to any one make of car—the Dearborn fits 'em all—they convert any pleasure car into the most dependable and sturdy trucks of one and two-ton capacity.

Dearborn Universal Truck Units are not an experiment. 1000 Universals are now in active service throughout the country, attached to over 65 different makes of cars. Some of them have been out for over a year. They have proven their strength, efficiency and economy in every instance.

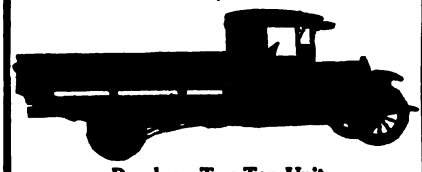
We want live dealers to take on this exclusive line. The opportunity for a big truck business was never so bright. Now is the time to get our proposition. Write or wire at once for particulars and specifications.

Dearborn Truck Co.
1252 So. Campbell Ave., Chicago, Illinois

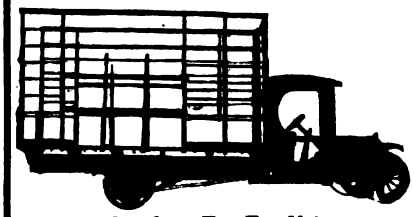
$350 and a Ford Car makes a Dearborn One-Ton Truck.
$400 and Any Car makes a Dearborn Universal One-Ton Truck.
$450 and a Ford Car makes a Dearborn Two-Ton Truck.
$500 and Any Car makes a Dearborn Universal Two-Ton Truck.



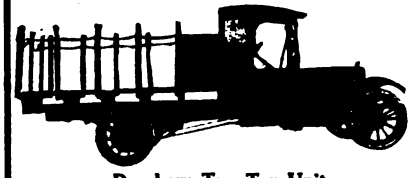
Dearborn One-Ton Unit attached to Overland Chassis



Dearborn Two-Ton Unit attached to Cole Chassis



Dearborn Two-Ton Unit attacned to Buick Chassis



Dearborn Two-Ton Unit attached to Glide Chassis



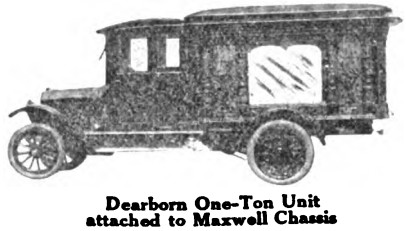
Dearborn Two-Ton Unit attached to Chalmers Chassis



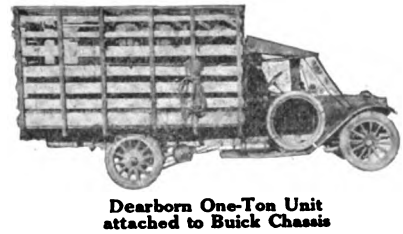
Dearborn Two-Ton Unit attached to Mitchell Chassis



Dearborn Two-Ton Unit attached to Cadillac Chassis

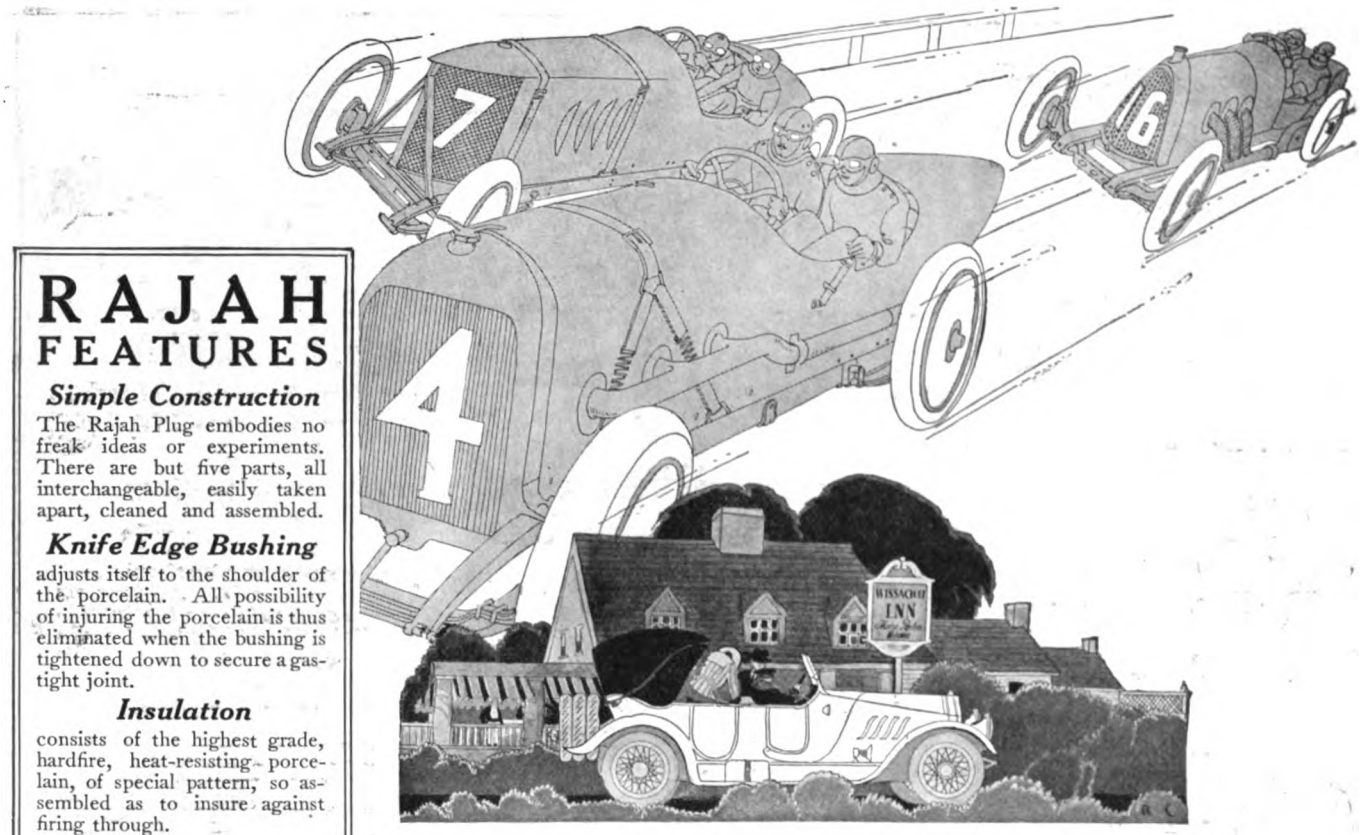


Dearborn One-Ton Unit attached to Maxwell Chassis



Dearborn One-Ton Unit attached to Buick Chassis

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RAJAH FEATURES

Simple Construction

The Rajah Plug embodies no freak ideas or experiments. There are but five parts, all interchangeable, easily taken apart, cleaned and assembled.

Knife Edge Bushing

adjusts itself to the shoulder of the porcelain. All possibility of injuring the porcelain is thus eliminated when the bushing is tightened down to secure a gas-tight joint.

Insulation

consists of the highest grade, hardfire, heat-resisting porcelain, of special pattern, so assembled as to insure against firing through.

The Button Top and Rajah Clip Terminal

do away entirely with the necessity for either thumb screw, nut or other device for attaching the cable to the spark plug.

Rajah Terminals and Adapters

are furnished so that Rajah Plugs can be used with any car.



Rajah Regular Clip Terminal

Adjustable to any cable. With the extra collar supplied fits any make of plug.



Rajah Ferrule Clip Terminal

With any size ferrule required. Fits any make of plug with the extra collar supplied.



Rajah Thumb Nut Terminal

Adapter for Dodge, Ford, Hup, Hudson, Maxwell, Mitchell, Packard Twin Six and Pullman.



Rajah Stud Terminal

Adapter for Buick, Chevrolet and Oldsmobile.

Manufactured by

Rajah Auto-Supply Co.

Bloomfield, N. J.

Sales Department

Edward A. Cassidy Co.

280 Madison Ave., New York

Backed by the racing world

IN a few vivid moments the racing car driver asks more of his car than the average car owner demands in six months' ordinary running. For his supreme needs the racer uses Rajah Spark Plugs because he knows they will make good.

While the demands of your customers are not so exacting, they do want the service, the efficiency, the power and the economy that a perfect and consistent spark plug will give. They get these qualities when you sell them the plug upon which the racing world depends.

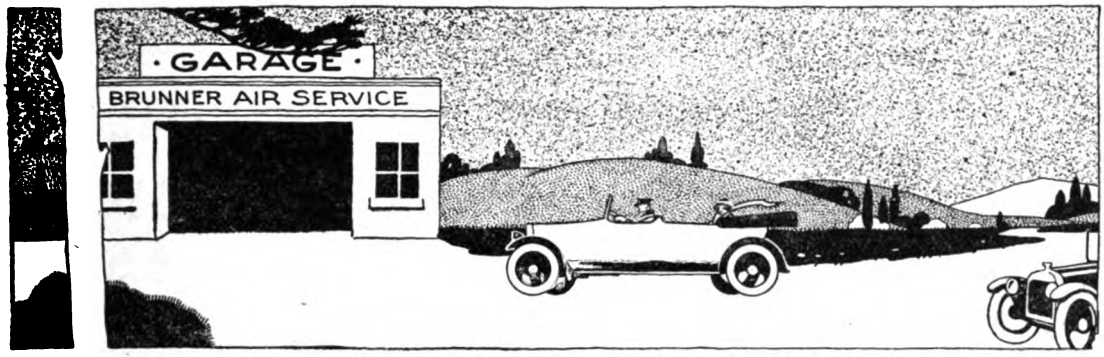
Sell Rajah plugs in sets. Get your customers to take out all other plugs and try Rajahs as they should be tried.



That is the only way for them to enjoy the increased power, quick pick-up and uninterrupted Rajah service.

RAJAH SPARK PLUGS

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Are You Prepared for the Big Spring Drive?

It is only a matter of a few weeks now, Mr. Garageman, when the roads will be alive with motorists eager for service, and the most important service in the early Spring is your Compressed Air Service.



No. 66

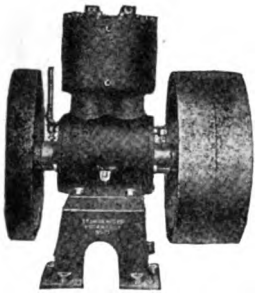
WHEN "LAST SUMMER" TIRES BEGIN TO BLOW

In the early Spring, when the boys are trying to coax more mileage out of "last summer" tires—then is the time your compressed air supply is taxed to the utmost and—then is the time you should be in position to make a favorable impression on the motorist by having your air supply ready to meet his demands.



No. 50

Is Your Compressed Air Service Going to Pass Muster This Spring?

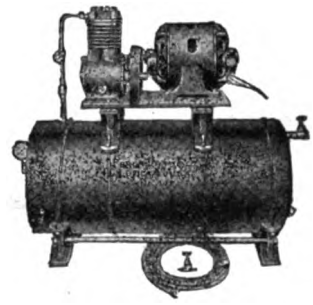


No. 17

This is a question which should be most carefully considered by you just now, Mr. Garageman, because if you do not show the motorists that you are able to deliver the goods in the Spring they will not go out of their way to patronize your garage during the long Summer months that are to follow.

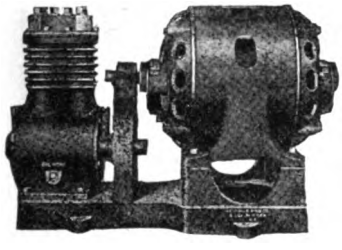
THESE ARE DAYS OF PREPAREDNESS

And those among you who prepare for the big Spring drive will taste the fruits of victory—the best way to prepare is to install a Brunner Air Compressor in your Garage.



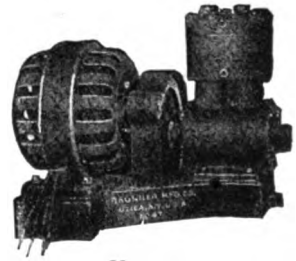
No. 542

INVESTIGATE THE BRUNNER AIR COMPRESSOR



No. 42

The Brunner is the pioneer of all Garage Air Compressors—it has been making good in the garage ever since the garage business has been a business—the Brunner Air Compressor is properly designed and built to suit the garageman's special requirements. No freakish attachments and no restriction of the lubrication to invite disaster but simply the same good substantial business proposition it has always been for the garageman who progresses with the times.



No. 47

Our new No. 15 Catalogue is the most complete and comprehensive book of its kind ever published. We will be glad to send you the catalogue and the name of the Brunner Jobber who covers your territory.



BRUNNER MANUFACTURING COMPANY

Main Office and Plant:
UTICA, N. Y.

Cincinnati Branch:
CINCINNATI, OHIO

"The Motorist Who is Brunnerwise—Knows Brunner Service Satisfies"



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YOU CAN FIGURE IT OUT FOR YOURSELF

TOOLS For Repairing Automobiles



The possible curtailment of the manufacture of passenger cars will naturally bring all cars now in use more often to the Repair Shop. This puts a responsibility upon the Repair Man that must be met—more and more automobile repair tools will be required—are required right now—you can figure it out for yourself.

G. T. D. Tools are favorites the world over because of their easy cutting and lasting qualities.

Our line includes the following:

Taps and Dies, for both hand and machine use.

Screw Plates, both U. S. standard and S. A. E. standard threads, including combination assortments containing both standards.

Threading machines for bolts and nuts.

Reamers, all kinds, single and in sets. Also special Reamers for Ford Cars.





FOR THE MANUFACTURER

We have developed several new and decidedly better tools for machine threading. These are the "Gun" Tap—the "Shear-Cutting Tap," the "Acorn" Die and the Wells Self-Opening Die. These tools will positively boost production and reduce threading costs.

Send for catalog and booklets showing these and other tools for machine use. Ask for Gage Bulletin "How to Measure Screw Threads."

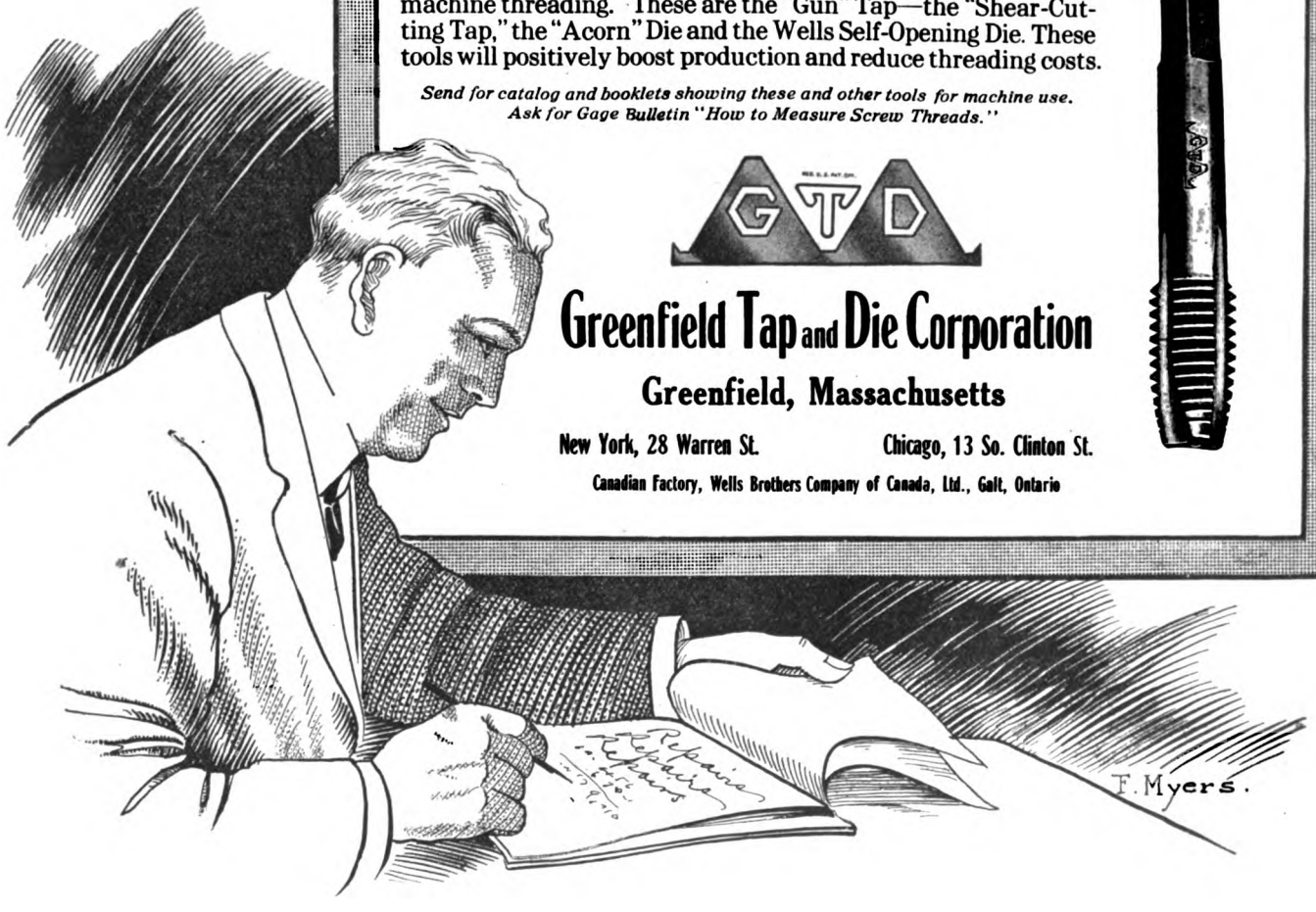
GTD

Greenfield Tap and Die Corporation

Greenfield, Massachusetts

New York, 28 Warren St. Chicago, 13 So. Clinton St.

Canadian Factory, Wells Brothers Company of Canada, Ltd., Galt, Ontario



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DU PONT AMERICAN INDUSTRIES

DU PONT

DEALERS WANTED

Our Nation-wide advertising campaign is producing thousands of inquiries, which must be referred to local dealers near the inquirer.

We need at once in many cities of 10,000 or more population:

The Leading Auto Top Maker
The Leading Auto Body Upholsterer
The Leading Auto Refinishing Concern
The Leading Auto Accessories Dealer
The Leading Boat Maker and Repairer

to supply the inquirers who answer our advertisements of

Rayntite Fabrikoid Top Material
Fabrikoid Motor Quality Upholstery
Fabrikoid Marine Special
Fabrikoid Truck Special
Harrison's Auto Enamel
Harrison's Marine Paints and Varnishes
Py-ra-lin Transparent Curtain Windows
Pontoklene Tar Remover and Cleaner
Du Pont Leather Renovator
Du Pont Outdoor Brass Lacquer

To insure quick action, please give us the following information:

Do you buy through a jobber? State whom and where.

If you buy direct and are not rated, give bank and commercial reference.

State nature of your business and line which interests you.

If we refer to you all inquiries from your vicinity, will you do your best to sell them our product?

If you are not a "live wire" and prepared to handle business with push and enterprise, please do not answer this advertisement.

SALES PROMOTION DIVISION

DUPONT, WILMINGTON, DELAWARE

DU PONT

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GET THESE MONEY MAKERS

Hudson Universal Jointed Valve Grinder



No more "botch work" or grinding cylinders only on one side.

This Valve Grinder does not keep you guessing—it goes straight to the mark!

It does such a thorough job of valve cleaning and grinding that you'll wonder how you ever got along without it.

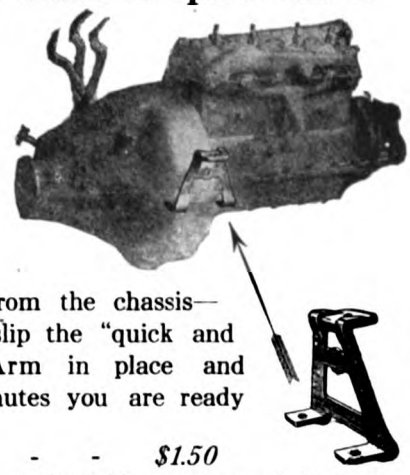
Especially useful in grinding the valves on fourth cylinder of Ford Engines.

Price - - $1.50

Hudson Crank Case Repair Arm

FOR FORD CARS

The greatest time saver known!



Take the short cut to crank case repairs—eliminate the "long winded" route and put the extra profit in your pocket.

Don't remove the engine from the chassis—simply loosen three bolts, slip the "quick and easy" Hudson Repair Arm in place and tighten—thus in a few minutes you are ready to make the repair.

Price - - $1.50

This is Philadelphia's house of good ideas—if you believe in saving time and money send for literature—It's your gain.

Hudson Motor Specialties Company

1606 REAL ESTATE TRUST BLDG. PHILADELPHIA, PA.

WITHERBEE STORAGE BATTERIES

For

STARTING — LIGHTING — IGNITION



WITHERBEE BATTERIES are of correct size, shape, voltage and capacity for every make and model of car, and for starting and lighting systems of any manufacture in general use.

MODERN—carefully constructed batteries—they possess high starting ability; the plates are specially processed to prevent buckling, and the jars are made of the finest rubber; the wood cases of acid-proofed hard wood.

Recognized standards since 1903.

Complete information, prices and illustrated catalog mailed promptly upon request.

WITHERBEE STORAGE BATTERY CO., Inc.

1904 Broadway; Factory, 643-9 West 43rd St.

NEW YORK

BRAENDER

"The Tyre to Tie To"

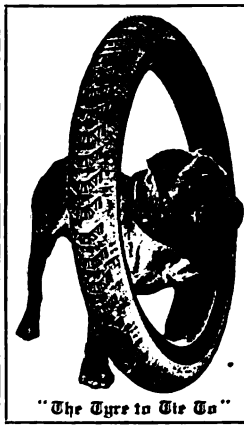
ESTABLISHED DEPENDABILITY—For six years BRAENDER TIRES have withstood the wear and tear that hard used tires have been subjected to and have always delivered a full measure of satisfaction to user and dealer alike.

THE TRADE is offered a proposition for creating permanent Tire sales and the opportunity to get continuous increasing profit.

If you are open to consider a proposition such as BRAENDER offers write today for particulars. Address your communication to any of our branches or to the factory.

SINGLE CURED WRAPPED TREAD BULLDOG GRIP NON-SKID AND PLAIN CASINGS

RED AND GRAY INNER TUBES



"The Tyre to Tie To"

HAND MADE TIRES OF BEST QUALITY PRICED RIGHT

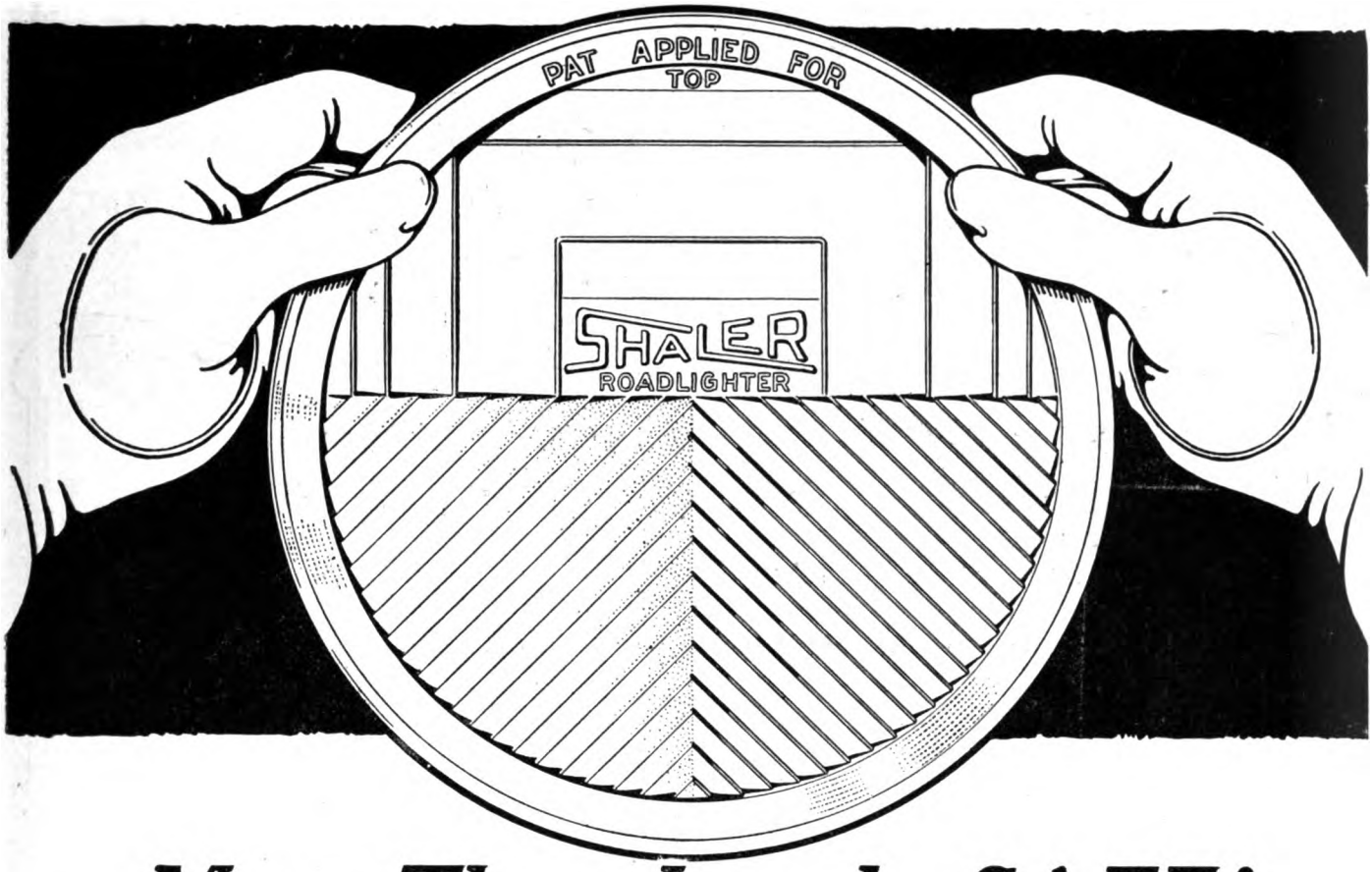
BRAENDER RUBBER & TIRE CO., Factory, Rutherford, N. J.

BRANCHES

NEW YORK	CHICAGO	PHILADELPHIA
250 West 54th Street	1350-4 S. Michigan Ave.	683 North Broad Street

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More Than Legal—SAFE!

because it gives a brighter and safer driving light than clear glass headlights, yet has no glare—absolutely none—and conforms to all "no-glare" laws. It obviates the need of spotlights, dimmers, auxiliary headlights and high candle power bulbs.

SHALER ROADLIGHTER

Protects *You* Against Danger

Practically every headlight lens on the market is designed primarily to *protect the other fellow.* The SHALER Roadlighter is the only headlight device that protects the USER against glare accidents—as well as the other fellow.

SHALER Roadlighters protects the *user* against the glare of headlights he meets by throwing on the edge of road so strong a light that no matter how intense the glare, he will not be blinded but can see the edge clearly and pass in safety without slowing down.

Limited Offer to Dealers Only

We want every automobile accessory dealer in the United States to try out a pair of SHALER Roadlighters on his own car—*at our expense.*

Mail the coupon for full particulars regarding this big offer. There is no obligation—don't put it off—clip and mail coupon *now.*

C. A. Shaler Co. 9803 Fourth Street Waupun, Wis.

DEALERS' COUPON

C. A. SHALER CO., 9803 Fourth Street., Waupun, Wis.

Gentlemen: Send me full particulars about your offer to let dealers try out a pair of SHALER Roadlighters at your expense. This obligates me in no way.

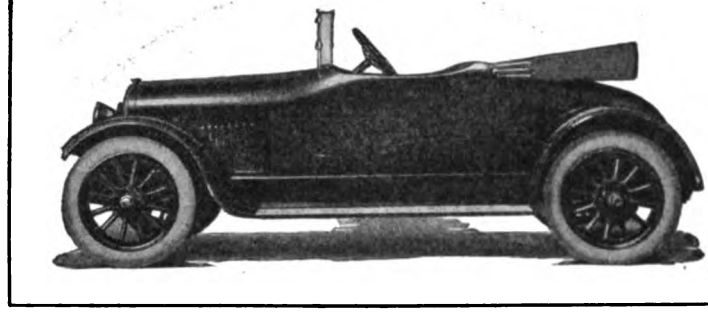
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Address.....

City and State.....

My Jobber's Name Is.....

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Pilot

"THE CAR AHEAD"

COPYRIGHT 1916 PILOT MOTOR CAR COMPANY

DEALERS NOW IS THE TIME

Winter is past. Within thirty days the driving season will be on in full blast.

THE SELLING SEASON IS HERE NOW.

Even in normal times, early spring is the best time to make a new contract. You have seven full, active, money-making months in which to lay the foundations of a stable business—to carry you through the following winter.

Under present conditions the need for early action is more than ever imperative.

Those that are fortified with new or additional contracts on which deliveries are assured will reap big benefits.

Even in normal times the Pilot Six Forty-five and the Profitable Pilot Contract offer unusual advantages. In these war days they are irresistable.

Let us tell you about them.

PILOT MOTOR CAR COMPANY, Richmond, Indiana, U. S. A.

6 CYLINDER—45 H. P. 5 PASSENGER TOURING $1295.
6 CYLINDER—45 H. P. 5 PASSENGER ROADSTER $1295.

EXPORT DEPARTMENT
MARITIME BUILDING—NEW YORK CITY

Open your doors to the steady and profitable sale of

Temme

SPRINGS FOR ALL CARS

DO all the lame cars drive to *your* door for Temme Springs and other things?

In most good towns, Temme Springs and Temme's Triple Action Service are known to be *as good as gold.*

Hundreds of repairers, who have "banked" on Temme and never lost, are putting up Temme highway signs today.

These signs *will* bring in business. Temme has tried them, so he *knows.* And now he offers *you* what won for him.

Temme Springs *"for all cars"* means just what it says—for all cars *since 1902.* Test us by naming the spring you need. Temme Triple Action Service will have it on the way to you the same day.

"For all cars" means *designed* for all cars to factory specifications. And so good are Temme Springs—so prompt the service—so fair the prices—that dealers in *all* cars now buy from Temme in *preference* to the car maker.

You need these springs, this service, these signs. They will make you money, bring new business, help you build the good reputation you are after.

If you delay you may lose this exclusive proposition. Write or wire us now, saying: "Send Temme Spring Service Station proposition at once."

Another Money-Maker



The JOHNSON SHOCK ABSORBER

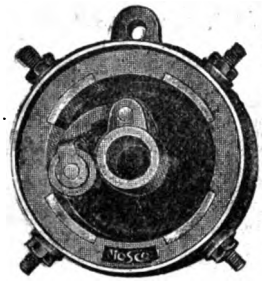
Sells readily—makes good—pays you a real profit—ask for offer to dealers.

Triple Action Spring Co. 79 E. 28th St. CHICAGO

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SPECIALTIES

Mosco No. 200 Timer for Ford Car

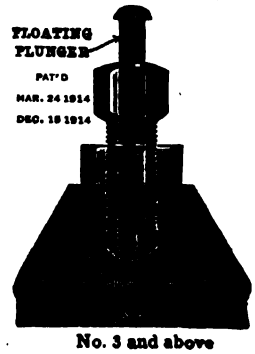


Patented Oct. 31, 1916

The case is made of extra heavy pressed steel, finished in aluminum. Gray bone fibre is used for raceway, with steel inserts dovetailed in and all lathe finished to a polished surface. The threaded terminals are insulated by fibre washers all the way through to contact points, thus removing cause of short circuiting common to this style of Timer.

Price, complete with brush, $1.50 each. Brush assembly only, $0.40 each.

Mosco Floating Plunger Wheel Puller



No. 3 and above

Starts a "Frozen" or "Stuck" wheel instantly. Strike the plunger; turn the screw, strike again and the wheel comes off without injury to hub-threads, spokes or axle.

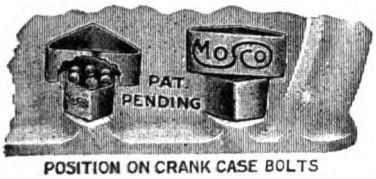
Made for 200 models of 40 popular cars.

Mosco Socket Nut and Bolt Holder for Ford Car

A REAL TIME SAVING DEVICE. Takes the place of that other man whose help is usually required for this operation.

Simply slip MOSCO Nut and Bolt Holder over the top of each engine or Transmission nut or bolt head, the wings protruding above the hex socket engage wall of crank or transmission case and prevent nut or bolt head from turning while the man underneath the car unscrews the bolts.

When replacing put head of bolt on top, slip on the MOSCO socket and proceed as in taking out.



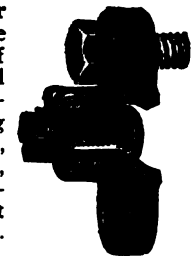
POSITION ON CRANK CASE BOLTS

Made of heavy pressed steel, with reinforced wings welded to body of socket. All case hardened and finished bright.

PRICE 15c EACH.

Mosco Anti-Rattling Ball Socket for Steering Rod of Ford Car

AN ENTIRELY NEW DESIGN. For taking up the wear and eliminating the rattle on worn ball sockets on both ends of steering gear connecting rod. An occasional packing of hollow hex plug with grease insures proper lubrication, smoother working and reduces wear. Tension of flat spring, which is held in position by head of bolt, prevents the hex plug in end from unscrewing. Slotted in hex end so that adjustment can be made with screw driver or wrench. Made of high grade semi-steel.



No. 2

PRICE 20 CENTS EACH.

YOUR JOBBER HAS THEM IN STOCK

MOTOR SPECIALTIES COMPANY, - WALTHAM, MASS.

THE BUSINESS OF THE TIMES

Use of Automobiles for Patriotic and Useful Industrial Service Enormous and Increasing All the Time

Automobiles for moving men and merchandise are indispensable, and of the greatest service in meeting national transportation needs. These machines must be kept in fit condition—and this means that

Men Engaged in the Tire Repair Business Can Help the Nation as Well as Help Themselves

HIGH PRICES OF TIRES MEANS MORE TIRE REPAIRING

Sky-high prices of tires, as well as the prevalent spirit of conservation in all lines, means that auto owners will repair their tires more than ever before, instead of buying new ones.

Start a Tire Repair Business or Increase Your Present Capacity With



THIS GREAT NEW-TYPE-F TI-RE-PAIR EQUIPMENT, ONLY $180

SPECIFICATIONS—Equipment consists of two cavities; one 4½-5 in. and one 3½-4 in., provided with Reducing Shell to take 2½-3 in.

Also fitted with Inside Patch Attachment, 3½-4 in., on which practically all sizes of inside work can be done.

Equipped with Self-Contained Boiler.

Set of Bead Molds, 4½-5 in., 3½-4 in., 2½-3 in., in either Quick Detachable or Straight Side furnished with each outfit.

Made in one-fifth circle only.

WRITE TODAY FOR FREE BOOKLET, "Tire Repairing, the Business of the Times." USE THE COUPON

We make a complete line of Tire Repair Equipment for all kinds of service and at all prices. Catalog on Request.

THE AKRON RUBBER MOLD & MACHINE CO.

Manufacturers of Tire Repairing and Tire Builders' Equipment

917 Sweitzer Avenue Akron, Ohio

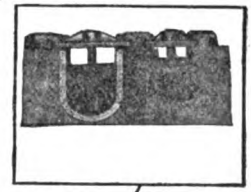
Pacific Coast Distributors:

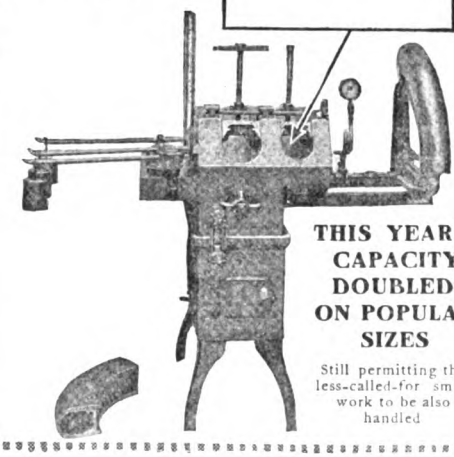
THE GEO. W. ENO RUBBER CO.

280 Golden Gate Ave., San Francisco 1026 S. Los Angeles St., Los Angeles

2½-3 inch Cavity has been increased to 3½-4 inch, and provided with a Reducing Shell to take 2½-3 inch, thus permitting two popular size tires to be cured at the same time, doubling the capacity of equipment on popular sized work.

New-Type-F Equipment





THIS YEAR'S CAPACITY DOUBLED ON POPULAR SIZES

Still permitting the less-called-for small work to be also handled

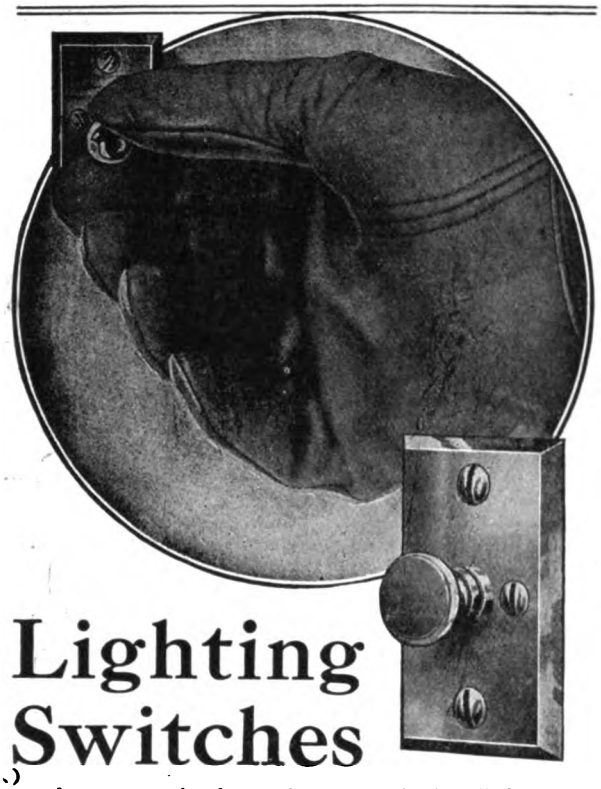
Gentlemen:—Please send full particulars regarding your Ti-Re-Pair Equipment, and copy of free booklet, "Tire Repairing, the Business of the Times."

NAME .....

ADDRESS .....

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CONNECTICUT



Lighting Switches

are the neatest, simplest and most easily installed equipment of their kind on the market.

Easily operated with a gauntleted hand.

Simple construction insures unending service and satisfaction.

Connecticut switches are designed to provide every arrangement of lighting control that can be desired.

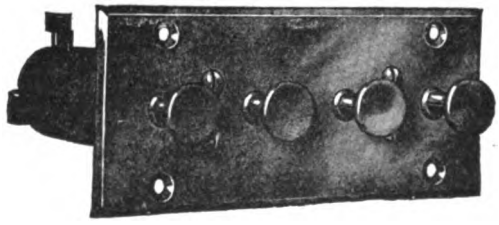
One switch for all lights, individual switches for each, or any choice of functions, individual or in combination.

HEADLIGHTS
The use of resistance for dimming the use of double filament bulbs, or the use of large or small bulbs.

HEAD, SIDE AND TAIL LIGHTS
Head and tail lamps on and off together. Side and tail lamps on and off together.

DASH LAMP
Individually or in conjunction with tail light. These are the principal functions of our standard switches but these by no means indicate the limits of control to which we are confined. Every practical arrangement has its switch.

Trade catalog illustrating and describing full line upon request



CONNECTICUT TELEPHONE & ELECTRIC COMPANY
Meriden, Conn.

VULCANIZERS MILLER TIRES

Complete Cure—One Heat — Extra Ply—5,000 Miles

NEW 1918 MODEL "4 CAVITY" EN BLOC

Insulated Air-Cooled Flanges Prevent Marking Tires

Complete---Gas Burner
$150.00

One of the 60 Kinds in Style

From 90c up



We teach Tire Repairing FREE OF CHARGE at factory or by mail.

Extra Ply Tires
Give More Miles at Less Cost

"COG" & "Wrapped" Treads contain 25% more Fabric and Rubber than Standard.

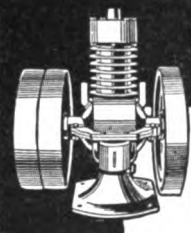
More Fabric Means Less Blowouts—More Miles

New 80-Page Catalog on Request
Exclusive Tire Distributors are Repeating Sales
For Price-Lists—Repeat Sales System

WRITE DEPT. "H" CHAS. E. MILLER
ANDERSON, IND., U. S. A.

The Oro Dealer should be Your Dealer.

GOOD as GOLD



THE Oro Dealer has a line of Auto Accessories that are well made, perfectly finished, and backed by an uncompromising guarantee.

Oro
GOOD as GOLD



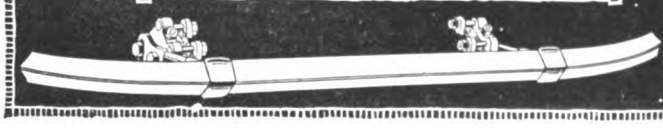


Accessories give the kind of service automobile owners like to dream about but seldom get.

Each Oro Product has been made to fill a particular demand. It has come into being because its manufacturers felt the need of a quality article in that field. Yet the cost of Oro Accessories is very moderate.

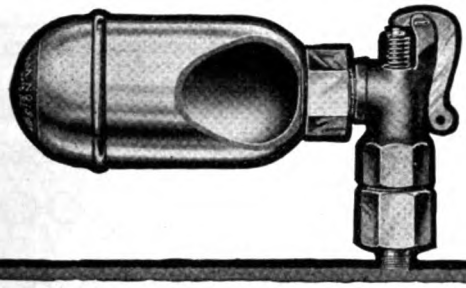
For catalog and prices, write

THE AU-TO COMPRESSOR CO.
Dept. 62 Wilmington, Ohio



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ALREADY

Some of the biggest truck makers in America have recognized the value of the Buell Explosion Whistle. The Pierce-Arrow, White, Little Giant, Columbia, Mack, Selden, Sandow and many others are equipped with this device, or install when so requested. It has proven the best in operation and durability.

THAT Is Conclusive Proof of Quality

It is also evidence of the rapidly growing DEMAND for the Buell. Not only manufacturers but thousands of private owners are daily recognizing Buell superiority and discarding old type signals for this very latest and most efficient safety warning device. Its 10-year guarantee; its simplicity of design and operation; its power secured directly from the engine; carry great weight with buyers.

Each Buell sold means a satisfied customer and increasing sales and profits for Buell dealers.

Write Today for Attractive Dealer Proposition

Get Your Share of This Business

BUELL MANUFACTURING CO.
1612 Michigan Blvd., Chicago

BUELL TRADE MARK EXPLOSION WHISTLE



STYLE with SERVICE

When spare shoes are covered with the Allen Tire Case you not only add style to the car, but you increase the life of the spare shoe when finally used.



The ALLEN TIRE CASE

is the perfect protection for spare shoes. Prevent deterioration from sunlight, oil, and water. Made in three classy styles, all sizes. At dealers, or write

THE ALLEN AUTO SPECIALTY CO.
16-24 West 61st Street New York
2007 Michigan Avenue, Chicago

"YANKEE" TOOLS Make Better Mechanics

Multiplying Man's Power

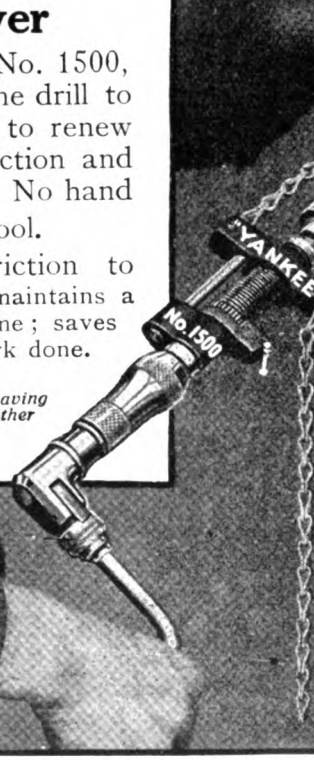
With the "YANKEE" Chain Drill, No. 1500, you don't use your fingers to advance the drill to the work; nor stop at every few turns to renew the cutting feed. The "YANKEE" Friction and Ratchet Feeds do both—automatically. No hand feeding at all! *You* simply revolve the tool.

Feed is instantly shifted from Friction to Ratchet, or back, at a finger touch. Ratchet maintains a fixed, positive feed. No guesswork! Saves time; saves drill breakage; saves the man; and—gets the work done.

Your dealer can supply you

Write for free "'YANKEE' Tool Book" of time- and labor-saving tools for garage or repair-shop—Bench, Chain, Breast, Hand and other drills; wood-boring and screw-driving tools.

NORTH BROS. MFG. CO. PHILADELPHIA, U. S. A.



"YANKEE" Chain Drill No. 1500

"YANKEE" Chain Drills are indispensable for automobile work.

No. 1500—3-jaw chuck for rounds up to ½ in. Length, 9¾ in. Weight, 3¼ lbs.

No. 500—2-jaw chuck for squares up to ½ in. Length, 10¾ in. Weight, 3½ lbs.

Square thread screw; hardened ends; ball bearing.

Price, $3.90

"YANKEE" Breast Drill No. 555 is often used to operate Chain Drill.

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A PATCH

That Will Not Loosen, Leak Creep or Blow Out!



20th CENTURY

Self-Vulcanizing Patch

Makes Permanent Repairs Instantly, and Without the Use of Heat or Tools

It is a three-ply Patch, using a ply of raw Red Rubber next to the inner tube, which guarantees a quick, smooth job of vulcanizing; then a ply of semi-cured rubber next to the khaki cloth. This rubber is not affected by the heat and will not melt, making our Patch absolutely **Leak-Proof;** then comes the ply of best grade khaki cloth, which gives the Patch its strength and durability.



This Construction Makes a Patch We Guarantee Not to Loosen, Leak, Creep or Blow Out, and to Give Satisfaction in Every Respect.

Leak-Proof

Made in 4 sizes	2¼ x 16—	36 Square Inches	$0.50
	4 x 15—	60 Square Inches	.75
	6 x 18—	108 Square Inches	1.50
	7 x 75—	525 Square Inches (Garage Size)	4.00

If you want a Patch, call for a "20th CENTURY." We make all kinds of Patches, all Sizes and Prices.

If your JOBBER or Dealer has not got them, write to us direct.

20th CENTURY TIRE PROTECTOR CO., MIDLOTHIAN, TEXAS

Two New Money-Makers

Presto BULB TESTER

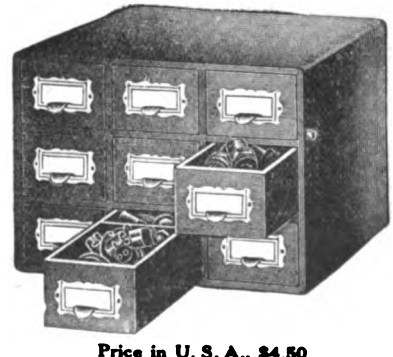


Price to Dealer $4.00 in U. S. A.
Price to Dealer $6.00 in Canada.

Here are two new members of the family of meritorious and useful Presto Specialties. Both of these accessories are business builders, putting your business on a systematic and accurate basis.

The Presto Bulb Tester determines accurately the voltage of all automobile electric light bulbs, and tells you instantly whether the bulb is burned out or not; all lamps of any voltage from one and one-half volts to twelve volts. The lever switch has different contact points for one and one-half volt, three, six, nine and twelve volt bulbs. It attaches to any ordinary 110 volt lamp socket. Equipped with seven feet of lamp cord. It is enclosed in a neat metal case black enameled with nickel plated trimming. Every dealer needs at least one of the Presto Bulb Testers so that he may test all the bulbs he buys or sells and be assured of the correct voltage of each bulb, and that all lamps are perfect when sold.

Presto CABINET



Price in U. S. A., $4.50
Price in Canada, $6.50

Garages, dealers, and repair shops need this cabinet to keep their electrical Edi-Swan Fittings for the lighting equipment of automobiles in neat array and easy access. The cabinet is 12"x12"x9" mission finished wood and contains 9 drawers each with a division, giving 18 spaces in which to keep connectors, plugs, switches and other small accessories.

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FOR THE

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For the benefit of dealers, garages, and repair men, we are prepared to furnish our keys put up in two assortments. Every garage and repair man should keep these on hand. They may be purchased from the leading jobbers or ordered direct from the factory.

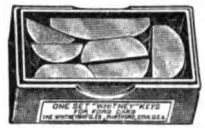


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One set of keys for the Ford car. These keys are of the special material and special treatment specified by the Ford Motor Company.



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Brictson Tires are puncture proof, and proof against blowouts, skidding, rut wear, rim cuts, and can't be damaged by oil or gasoline. Wonderful resiliency, easy riding and economy commend them to every car owner.

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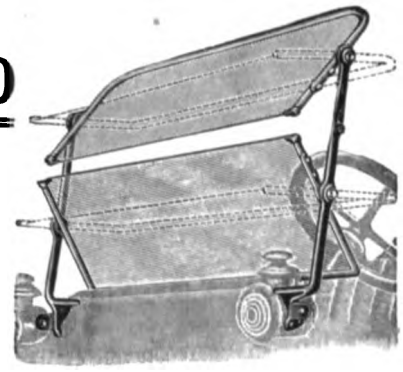
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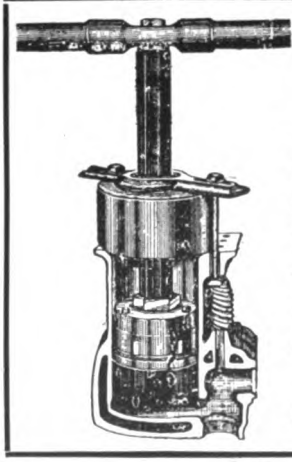
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ANYBODY CAN PAINT A CAR IN 3 DAYS

and completely obliterate the marks of the Summer's usage with a hard, wearing, beautiful surface on all parts.

THE THREE COATS PUT UP IN SETS COMPRISING:

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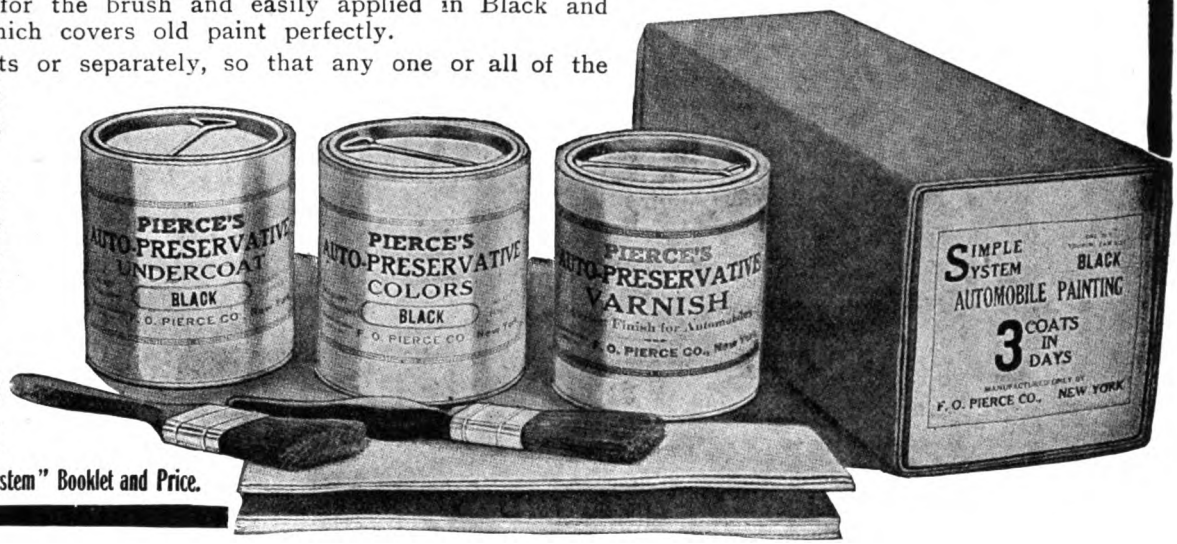
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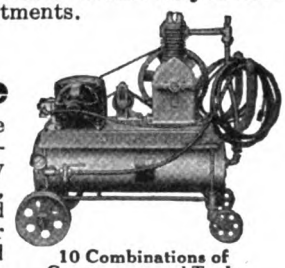


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The Curtis Compressor is the only one designed to prevent flooding the cylinder with more oil than it needs for lubrication. This, because of our controlled-splash oiling system. No excess oil is forced into the air line. **Oil ruins tires**—air free from oil means fewer blowouts and increased mileage all around for your customers, with less tire adjustments to you. Make your place the most popular one in town. An easy and inexpensive way, is to install a Curtis Compressor. The customer assumes if you have the best free air service, you will have the best service in all departments.

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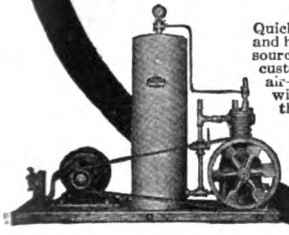
Live garages and service stations are using Curtis Air Compressors. Motorists expect free air service. Why not give them the best and win over new customers by supplying, not only reliable air service, but **Curtis Air—Free From Oil.** A poor air system which shoots oil into the tires, or which is unreliable, drives customers away. Thousands of Curtis Outfits are rendering daily, effective, efficient service all over the country. Your Curtis Compressor can further pay for itself by supplying air for air hoists, painting, cleaning, vulcanizing, blowing dust and drillings from tools, and many other things. Curtis Compressors are backed by manufacturers who have been specialists in this line for twenty-five years.



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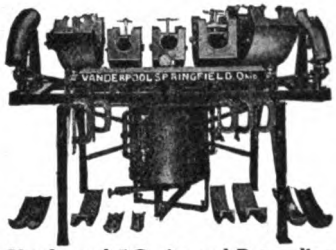
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will get you your share of the big Winter and Spring tire repairing. Order a Vanderpool Vulcanizer today—don't put it off—you lose money every day you delay.

Get into this big profit-making business while work is plentiful—prices are good and everybody has more than they can do. Vanderpool Vulcanizers do the best—yes, the very best work, and that's the kind of work that satisfies customers and builds your success.

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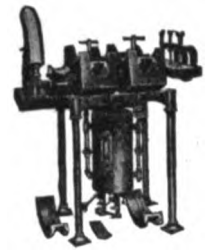
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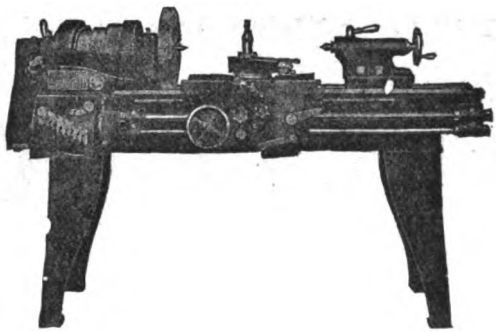
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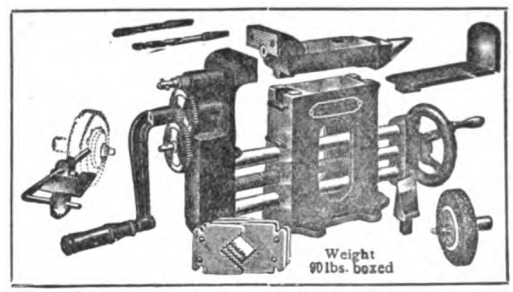
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A WORKSHOP IN ITSELF



Price Complete $14
(Worth $25)

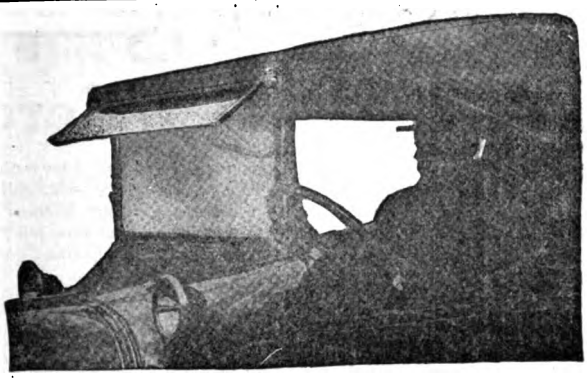
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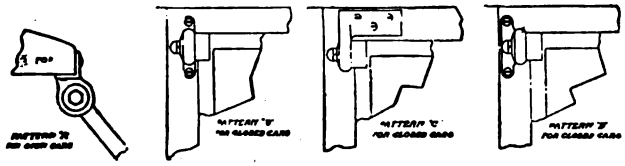
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If we did not give the very best values in **Job Lots** and **Seconds,** we would have to board up the doors of our place tomorrow.

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REFLEX equipped White Trucks tearing up rails under their own power. A striking example of REFLEX performance

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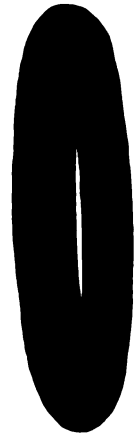
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33 x 4	24.55	49.10	26.38	52.75
34 x 4	25.23	50.45	27.10	54.20
32 x 4½	26.95	53.90	28.93	57.85
33 x 4½	27.65	55.30	29.70	59.40
34 x 4½	28.38	56.75	30.48	60.95
35 x 4½	29.08	58.15	31.20	62.40
36 x 4½	29.75	59.50	31.98	63.95
33 x 5	33.70	67.40	36.13	72.25
35 x 5	35.30	70.60	37.90	75.80
37 x 5	36.95	73.90	39.73	79.45



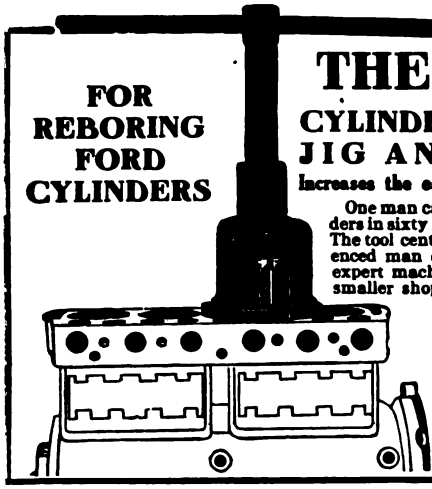
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We will refund the full price paid us for any of these tires returned intact within 30 days from date of purchase.

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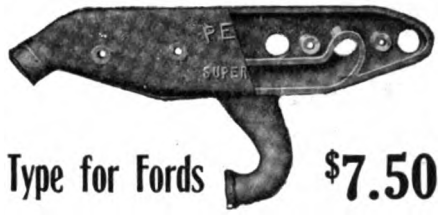
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Are Doing Their Bit

Enable Your Car to Meet War Time Requirements of Economy and Fuel Conservation.

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If your car is not equipped with a PECK'S Super Heat Manifold, order one today. It is guaranteed to give you from 40 to 60% more miles per gallon, with the same efficiency that could be obtained with high-test gasoline.

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With the increased cost of gasoline and with the poor quality, it is necessary to use some means that will vaporize the fuel, so the highest efficiency may be obtained. PECK'S Super Heat is the way.

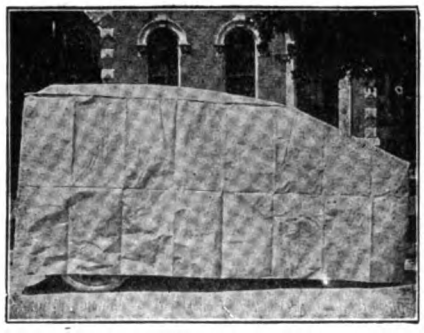
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PETRY CUT OUT

Pat. 2-6-17

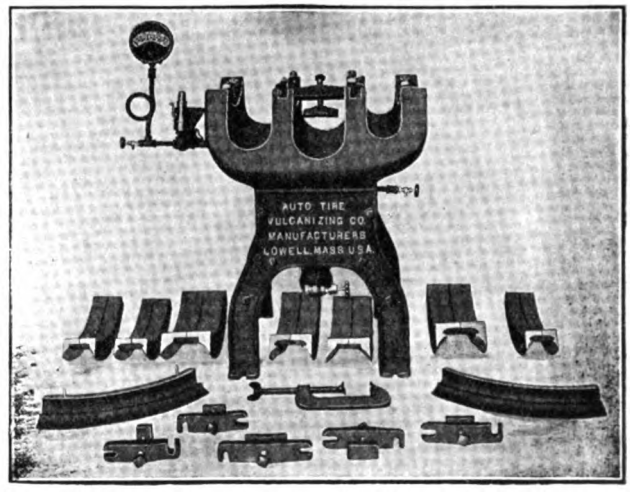


Gases expelled to the rear through patented flared opening, prevents all back pressure. Lever has seven adjustments, which make easy installation. Spring is away from the body of Cut-out, does not absorb heat, has a simple tension adjustment and easy action, no strain on the exhaust pipe.

Ends accurately machined for pipe size and fitted with set screw, which insures a permanently rigid installation.

Sizes—1½" to 3¼"
Prices—$4.00 to $6.00

N. A. PETRY COMPANY, Inc.
1313 Race Street Philadelphia



Exceptionally Large Profits can be made by Repair and Garage Men with

No. 8 Lowell Adjustable Sectional Vulcanizer

It's different, superior, economical in operation, in fact beyond comparison.

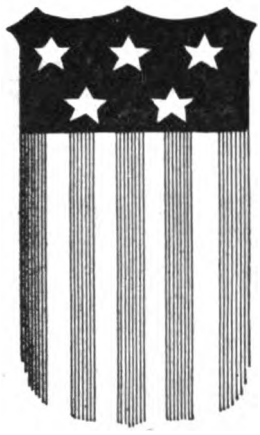
Complete and thorough work can be accomplished with this vulcanizer at all times.

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Auto-Tire Vulcanizing Company,
140 Powell Street - - - Lowell, Mass.

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of National Rubber Tire Filler was won through exceptional performance in forever eliminating the bugaboo of auto pleasure—punctures and blowouts.

Made of Pure Rubber, cut in small particles treated, moulded and vulcanized by our special steam process. Fits all the different size casings. No inner tube and air used, eliminating the cause of all tire trouble. Stops the expense of buying, repairing and replacing the inner tubes. Doubles the life of the casing—reducing the cost one-half. Can be transferred and re-transferred as often as is necessary. Has been sold throughout the U. S. and many of the Foreign countries for six years. Has years of actual service record back of it. It has all the easy riding qualities of the air-filled tire, with none of its faults and uncertainties. No waiting to use your car; it is always ready whenever you need it. Let us send you small sample and tell you more about it.



NATIONAL RUBBER FILLER CO.
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DETROIT DETACHABLE WEATHERPROOF TOP



Absolutely Storm Tight from Windshield to Rear Window

Eliminates, instantly, all the Ford drivers' former hardships. It is the only all-weather top that does away with the objectionable features of a detachable top and affords the car owner an enclosed or open body for year-round use at a really low price.

It is Absolutely Rattle Proof and Will Last as Long as the Car

Detroit easy sliding flexible doors, which disappear into the roof, are three inches wider than the doors of the Ford; this gives ample entrance for the occupants even though the arms may be filled with bundles. For the other 9 big improvements, see our literature.

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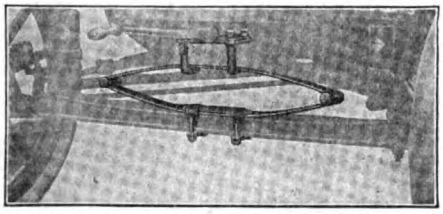
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Can Be Put On By Anyone in 20 Minutes.

NO HOLES TO DRILL - NO MECHANIC NEEDED.

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With the Ford Front End Stabilizer you can drive your car or truck at high speed and eliminate the danger in the car lurching from side to side when riding the ruts, rough spots and sand.

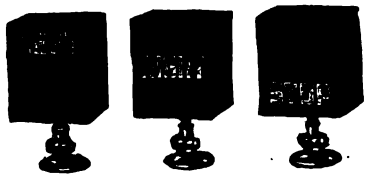
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One signal box only on the left rear fender shows the words above in red, both front and rear—day and night.

Passenger automobiles in New York City alone were responsible for 7,419 accidents in 1917, which resulted in 225 deaths.

The Smith Auto Signal provides the cheapest insurance against accidents and the fear of accidents. It distinctly signals your driving intentions to both those in back and those in front—and also the traffic policeman.



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Operates from plainly marked single handle three-way switch. Very little electric current used.

Simply constructed—nothing to get out of order. Easily installed—directions with every signal.

Already installed on 40 different makes of cars. Measures 6" high by 5" wide by 4¼" deep. Weighs only 3½ pounds.

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Representatives Wanted

Sell The Spring You Would Use On Your Own Car

Put yourself in the customer's place. — That will make more business for you, and eventually, for us.



PRACTICALLY UNBREAKABLE

THERE'S A HARVEY JOBBER NEAR YOU

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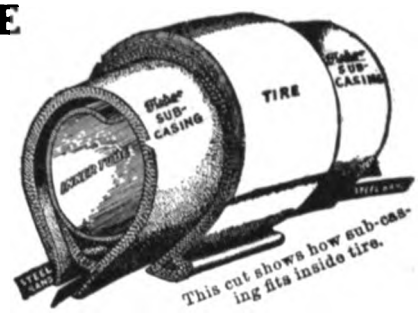
MORE MILES PER TIRE LESS TIRES TO BUY

THE BLOWS THAT YOUR TIRES RECEIVE, WHEN YOU STRIKE OBJECTS IN THE ROAD, LEAVE WEAKENED PLACES IN THE FABRIC.

A TIRE IS AS STRONG AS ITS WEAKEST PLACE

These weakened places are hard to detect now, but will result in blow-outs later.

RIM-GRIP SUB-CASINGS reinforce the fabric of the tire at all points from bead to bead. They make a partially worn tire stronger than it ever was. It can be worn out completely and the sub-casing used in another tire. As the cost of equipping a car with new tires is much greater than last year, it will pay you to investigate Rim-Grip Sub-Casings. *Write for particulars.*



This cut shows how sub-casing fits inside tire.

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OUR **Double-Service Tire** is **Two Standard Make** tires bound together so that each strengthens the other—so that the two will give **More than Double** the service that either one alone could give. This joining together of **Two A-No. 1 Tires** by our process makes a tire that has **Double the Strength, Double the Fabric** and **Rubber,** and **Double** the **Thickness and Protection** for the inner tube, against the accidents and mishaps of the road, makes it **Absolutely Puncture-Proof and Cut-Proof.**

Our **Double Service** Tires are giving upwards of 6,500 miles of wear and service to Automobile Owners all over the United States, and they will give YOU that too, and with added security from punctures and cuts of all kinds.

Make sure when ordering tires to state whether Q. D., Straight bead or Clincher type.

We carry a full line of New First and New Second Tires at a big saving. Write for prices, mentioning sizes. Prices upon request.

Terms: 10% Deposit, Balance C. O. D.

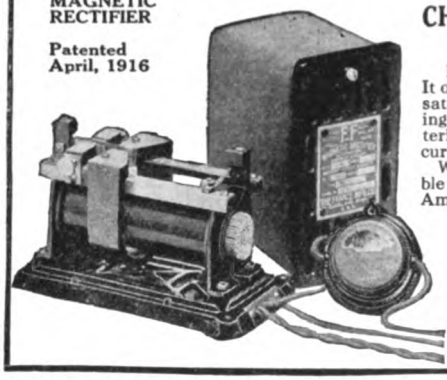
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We furnish complete portable Charging Rheostat with Ammeter and Current Regulator for service on D. C. Circuits.

$24 Complete, and up
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$60 Complete with triple gear attachment (as shown).

$50 Less triple gear attachments.

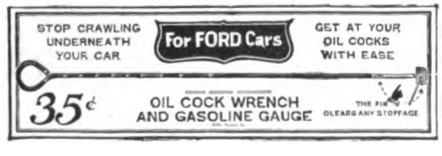
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The only machine or tool made that will ream bushings in all three drums and triple gears. **Absolutely true, perfect fit and alignment.**

2 minutes labor required to set up and ream one bushing. 25 minutes to completely overhaul a transmission. Every job uniform. Saves 75% of labor costs. Send for special circular of other labor-saving tools.

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Our force of specialty men is spreading the message of 100% Lubrication. Wherever they go they convince dealers and motorists that

DIXON'S GRAPHITE Automobile LUBRICANTS

are better lubricants. Demonstration proves it every time.

This year we will again back up the efforts of our sales force with a campaign of newspaper advertising that will reach millions of motorists. We are going to keep right at it, week after week, as steadily as an engine that never "skips."

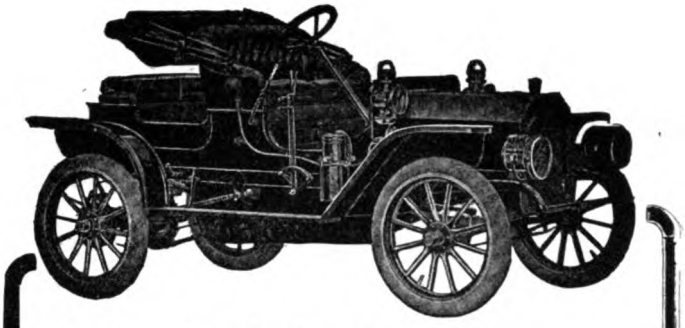
Our salesmen prepare the ground. Our advertising sows the seeds of heavy sales of Dixon's—the 100% Lubricants. Be ready to garner your share of this business, and cash in on our campaign of lubrication education.

Write for Dixon's Dealer's Deal No. 184-G.

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AND WAIT ON YOUR CUSTOMERS

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Famous Five-Minute Cure Cement

WILL CURE IN FIVE MINUTES

Will Not Overcure, If Left in the Heat for One Hour

Put Up in Seven Size Containers
Made in Two Grades—Red and Gray
Recommended for Both Casing and Tube Repairs

IF YOUR VULCANIZER IS YOUR BOSS, DECLARE YOUR INDEPENDENCE TODAY

Write for Prices

The American Rubber & Tire Co.

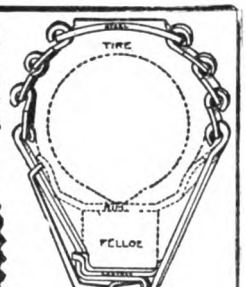
AKRON, - - - - OHIO

Hang on to your old tires. They will last as long as you live if covered with steel. **The Kimball Steel Protector** makes **Blowouts, Punctures** and **Rim Cuts** impossible. A few sections will hold any old blowout. Tires as flexible as ever.

Special inducements to those in new territory.



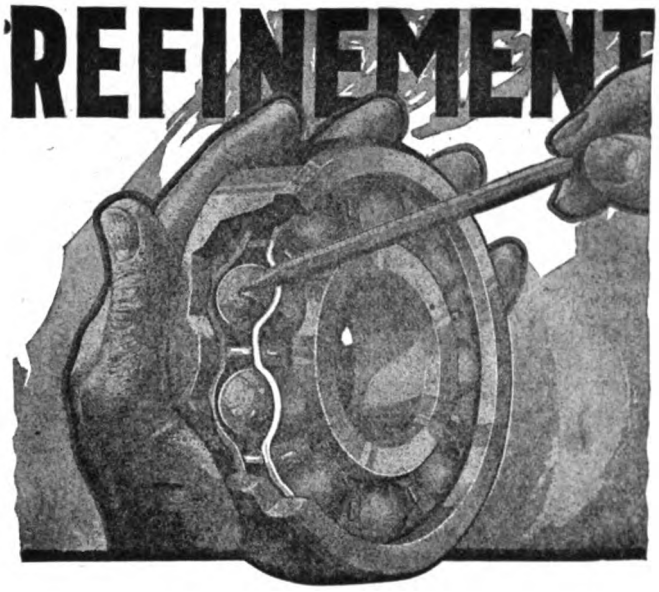




MUD CHAIN can be put on in a jiffy with one hand while standing on the run board. If you get in a mud hole you will laugh out loud. Hook the ends together and pull the little lever and they are on tight. Good for blowouts.

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New Departure Ball Bearings

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Lawn Mower Grinder

BIG MONEY-MAKER. Many of our customers make $300 in one season.
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like their products, need no introduction to the experienced steam or gas fitter.

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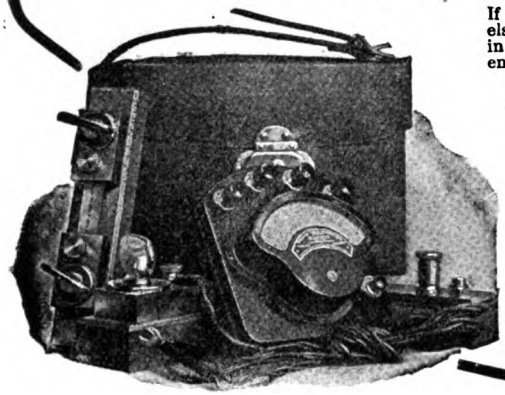
Complete Repair Package contains one 1-lb. can SMOOTH-ON Iron Cement No. 1, one 1-lb. can SMOOTH-ON Elastic Cement No. 3, one roll Tape, one 144 page Instruction Book. . . $2.00

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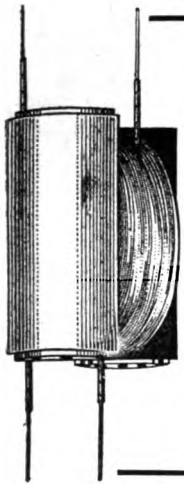
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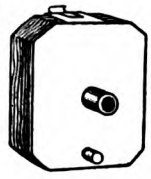
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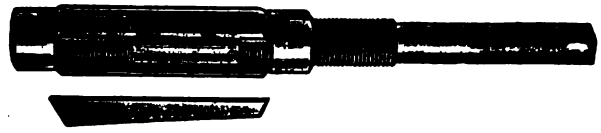
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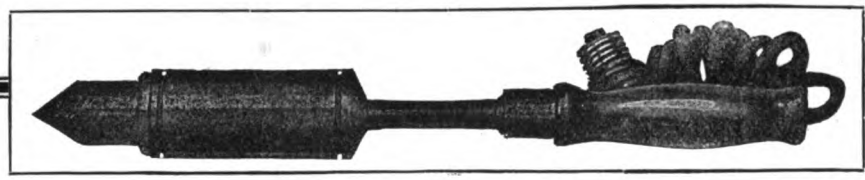
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ARE MADE WITH THE FAMOUS

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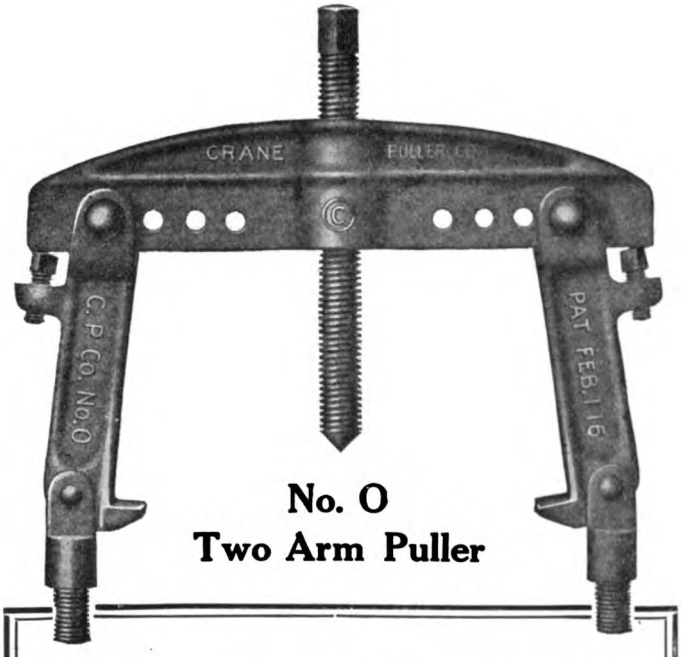
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Removes All Kinds of Small Parts Easily and Quickly

For the removal of timing gears, magneto and pump shaft gears—all small work, in fact, that is designed to be removed by stud-bolts screwed in tapped holes in the web, in addition to the regular functions of the ordinary puller—no device is comparable in efficiency and simplicity to the new

No. O
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This puller takes light work 5 inches in diameter and 3 inches from the end of shaft. It has the new patent Locking Arms, forked stud-bolts and case-hardened screw.

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A BRUSH

For Every Automobile

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We have a number of Brush Assortment Lists which will show you just exactly what brushes to carry in stock.

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Will Bring You Big Demand and Generous Profit

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Complete Tire-Doh Outfits sell at $1.00 and 50c. *Write for the special proposition we have open for you and samples of the helps we offer.*

ATLAS AUTO SUPPLY CO., 616 W. Austin Ave., Chicago



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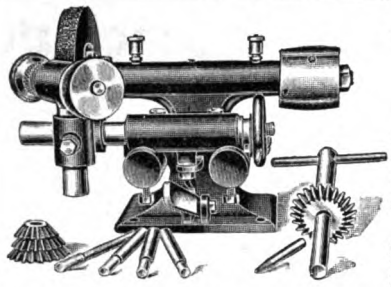
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IF YOU USE A

Nasco Valve Grinder

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Just the tool for those Tractor Valves.

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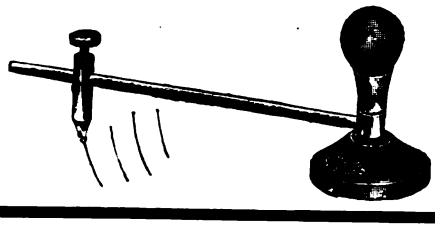
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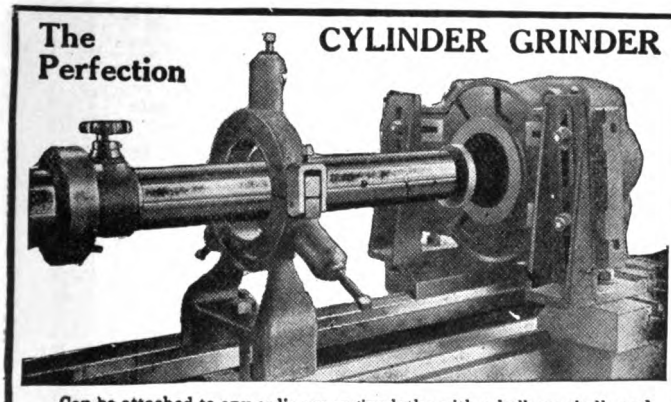
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5 Minute Vulcanizer



Mends Tubes in 5 Minutes

Easy to Use— Easy to Sell

Every buyer of a SHALER 5-Minute Vulcanizer becomes a booster! Every motorist who buys one shows it to his friends—gives them a demonstration—because it is such a wonderful thing.

This means big sales for you. As soon as you start selling the SHALER 5-Minute Vulcanizer, your customers will spread the news. You will quickly notice new faces in your store—new customers passing their money across your counters.

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The six round and six oblong patches and combustible discs that go with the vulcanizer are soon used up—and the motorist comes back to you for more. He pays you 75 cents for every dozen of these units. You make a good profit.

Can you realize what a big repeat business this means for you? Can't you see how it will bring car owners into your place for additional "ammunition"—who will also buy other goods? And that is what you need to build up your business!

Place Your Order with Your Jobber NOW

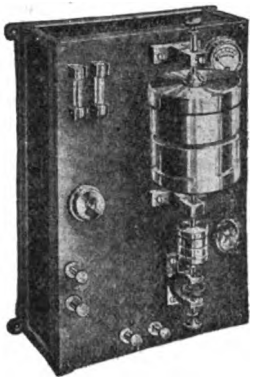
Don't delay! The enormous demand for SHALER 5-Minute Vulanizers has exceeded our factory capacity to make deliveries. We are building a large 3-story addition to our plant. But—to make sure of prompt shipments—place your order with your jobber now - specifying date of shipment desired.

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For charging batteries, breaking down sulphation or for any other purpose where it is necessary to change alternating current to direct current,

The Breco Converter

Is far superior, highly efficient, light and rugged—easy to operate, no expensive installation necessary.

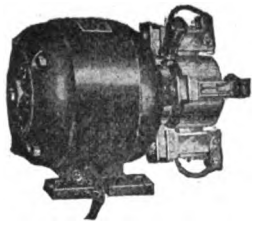
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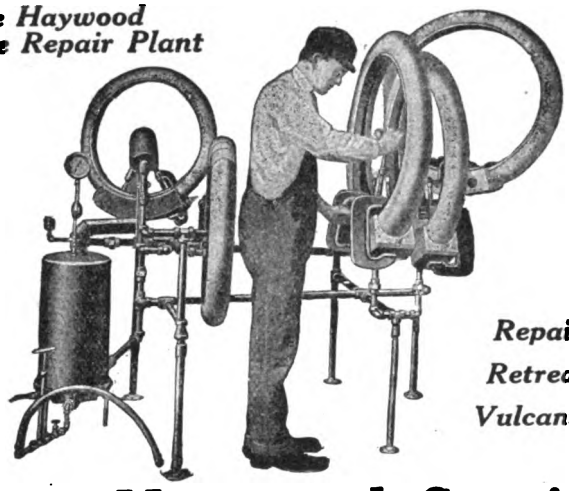
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The Haywood Tire Repair Plant



Repairs
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Give Haywood Service

HERE'S a standardized method of Tire Repairing—a method Nationally Advertised and known to motorists. Big money can be made either as side line to your present business or as a business by itself. **Equip your garage or store with a Haywood Plant.** Let it earn extra profits, or open a Haywood shop in your locality. **It's a rich opportunity.**

Write For Attractive Offer

ALL you need is one machine, a little training and you are ready to make money. A letter or post card brings all details. Interesting catalog explains **New Scientific Method** and gives particulars of our Co-operative Business Building plans. Write today.

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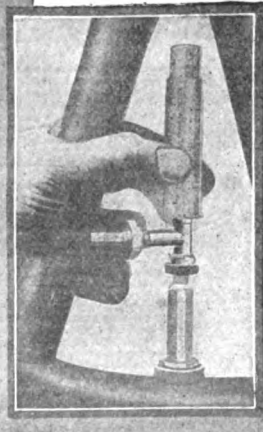
No trouble to pump tires



Perhaps you have been neglecting the all-important matter of tire-pumping and air-testing because of the exertion it involved; the time it took, and the annoyance it caused.

You no longer have that excuse, for with a

Schrader Universal Pump Connection



tire-pumping and air-testing are now simple and easy operations.

Ask Your Dealer to Show You How it Works

Price in U. S. A., 35 Cents

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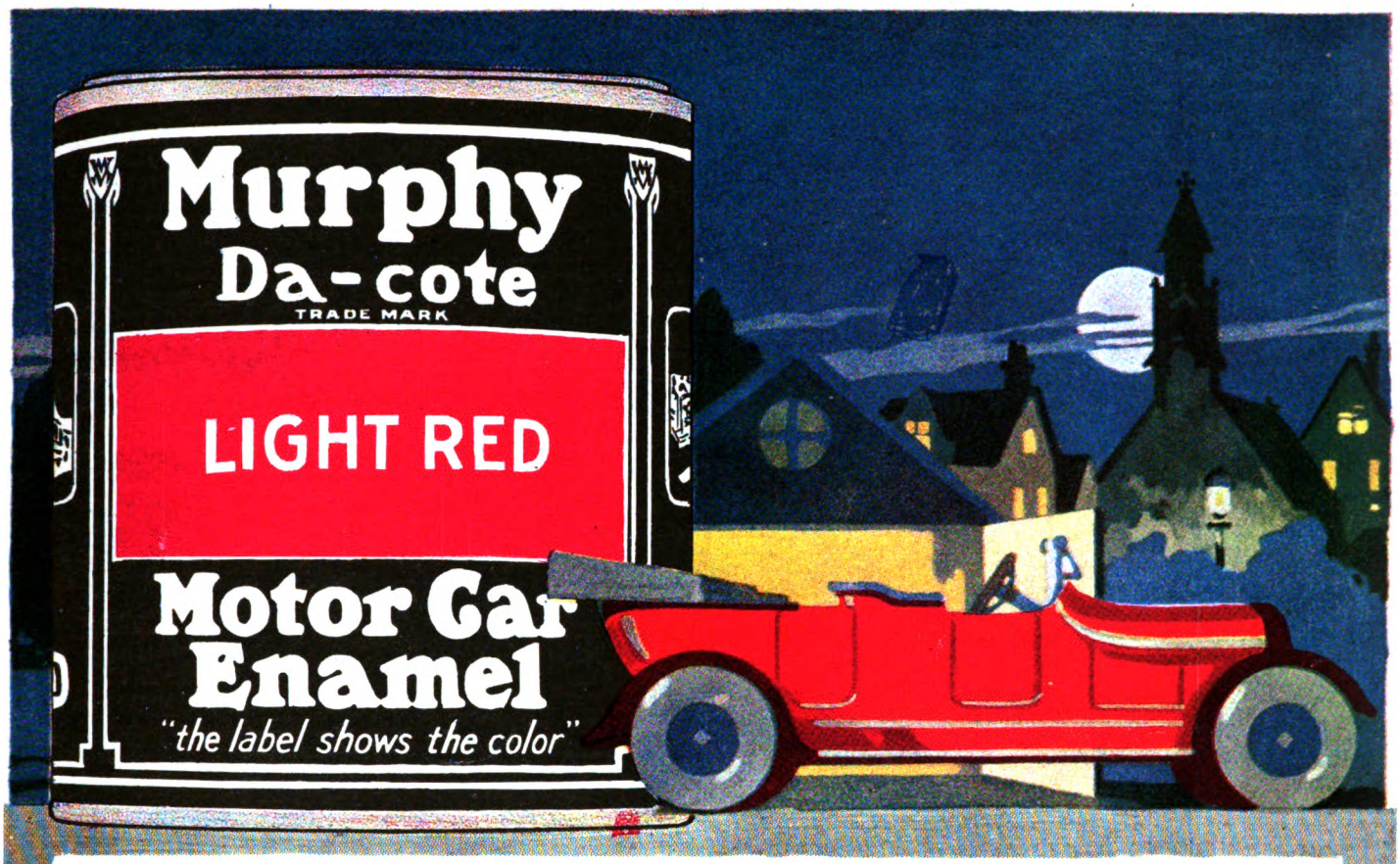
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We Suggest Stamps
War Savings Stamps
Without Shells Soldiers
Would Soon Succumb
War Savings Stamps
Will Supply Soldiers
With Shells.

Buy All You Can and Help Win the War

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"Paint your own car"

will be one of the slogans during the coming year of patriotic economies and scarcity of new cars.

Four automobiles in every five have never been painted since they left the factory.

Be the dealer in your town to supply the big demand for the quick, easy, reliable

Murphy Da=cote Motor Car Enamels

(Trade Mark)

Good enough for the professional painter.
Easy enough for the amateur.
Quick enough for either.
A great seller for the dealer.
Read our proposition to you on the next page.

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Murphy Da=cote

(Trade Mark)

A full line of practical one and two coat Motor Car Enamels made by a manufacturer known the world over for his motor car finishing materials. Designed to give the inexperienced amateur a satisfactory job with little labor in one or two day's time at small cost.

What you get in addition to the goods:

1. Aggressive advertising.
2. A novel and handsome window and counter display. (See next page)
3. The catchiest booklet and color card ever put out for a line of Motor Car Enamels.
4. A shelf display that "speaks for itself." The label shows the color.
5. A generous profit.



"Murphy Da-cote

TRADE MARK

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lotor Car Enamel

The motor fan can't resist the trick car showing three colors as he passes your window. When he pauses, he is caught and drawn into your store by the different colors on the labels.

"The label shows the color."

We have been told that this is one of he best window displays of the season. You will think so too. So will the car owner. When he enters your store, the shelf display of the different colored cans n different sizes is a powerful attention-getter. The whole story is on the label.

"Da-cote" tells him he can paint his car quickly.

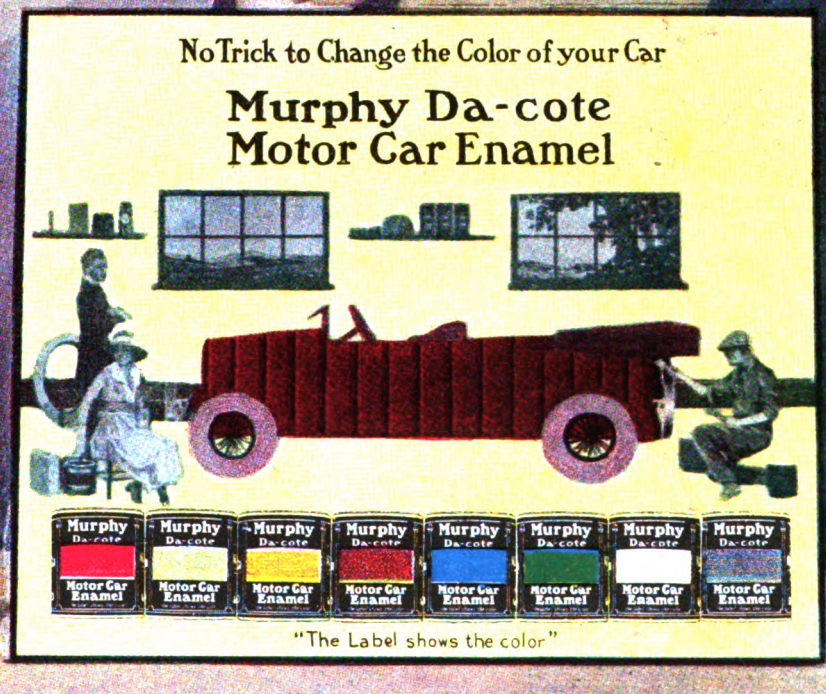
"Murphy's" tells him it is made by an expert on vehicle finishes.

Complete directions are on he can.

The exact shade of the enamel is shown on the can.

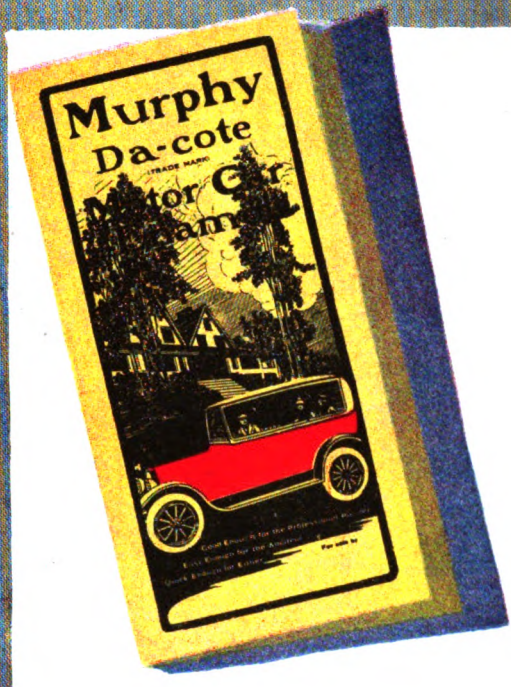
If you wanted to, you ould tell him to help himself while you waited on nother customer.





otor Car Enamel"

THE U.S PRINT & LITH CO N.Y.
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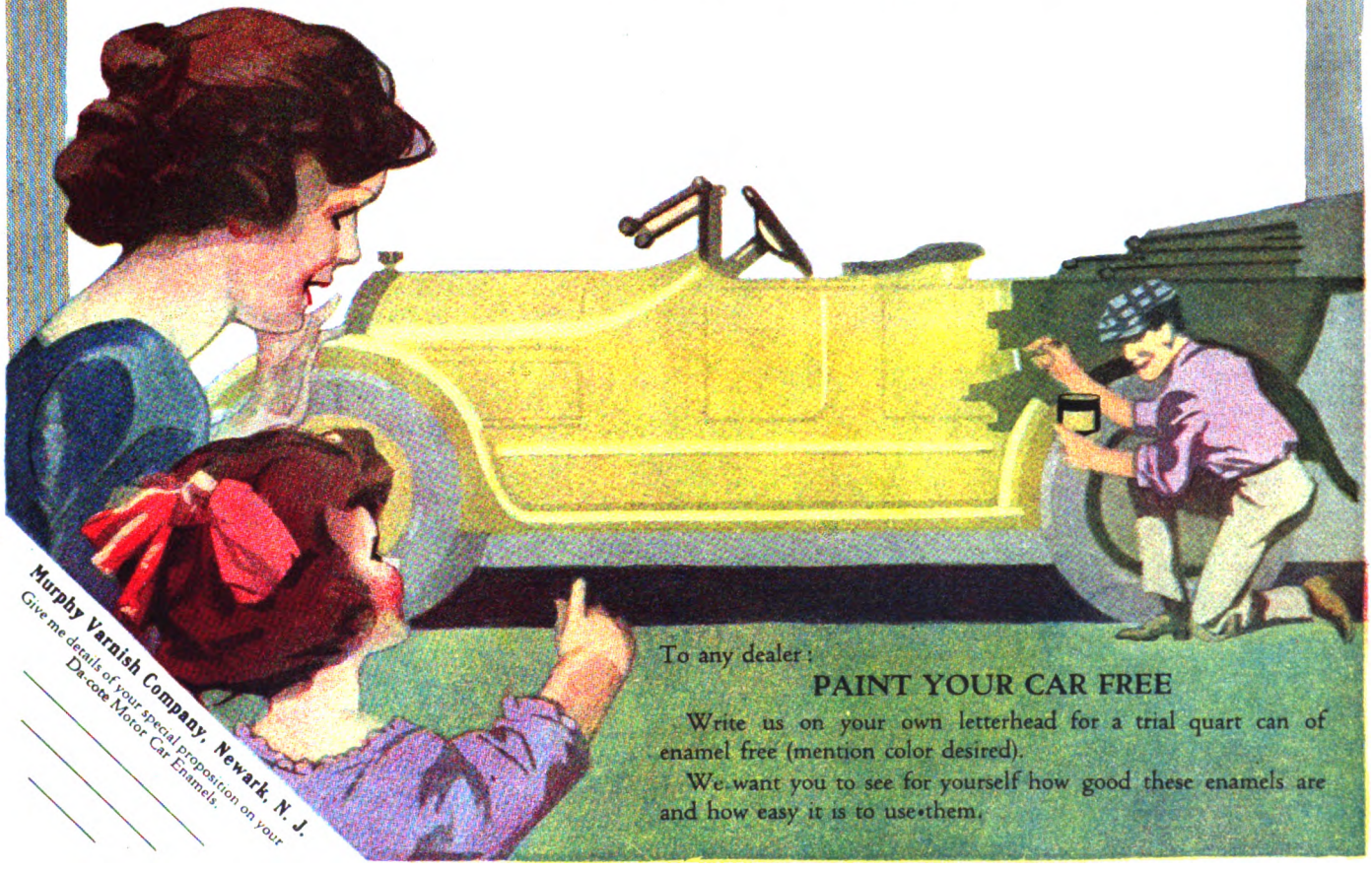


Murphy's Da=cote (Trade Mark) Motor Car Enamel

PUT a few of these cans on your shelves and in your windows, and show automobile owners **a way to be economical this year,** and still have new cars in appearance. You will get good pay for doing this.

Ask us:

"What is there in this Motor Car Enamel proposition for me?"



Murphy Varnish Company, Newark, N. J.
Give me details of your special proposition on your Da-cote Motor Car Enamels.

To any dealer:

PAINT YOUR CAR FREE

Write us on your own letterhead for a trial quart can of enamel free (mention color desired).

We want you to see for yourself how good these enamels are and how easy it is to use them.

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Automobile Dealer and Repairer

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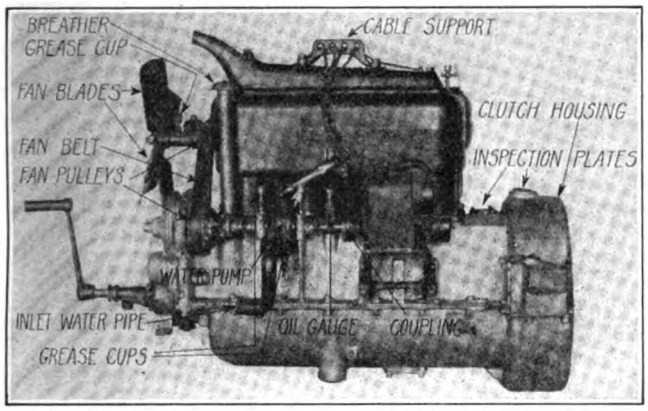
VOL. XXV. No. 1. NEW YORK, MARCH, 1918. PRICE {10c. PER COPY / $1.00 PER YEAR

How to Overhaul Your Own Car and Put it in Condition for the Coming Season

Practical Instructions for Car Repair, Showing the Owner How He Can Do the Work Himself and Release Mechanics for Government Work

BY C. P. SHATTUCK, M. E.

In these days when the Government is urging thrift and economy it behooves us motorists to do our share in the preparation of the motor car for the riding season which is fast approaching and by so doing we will release mechanics and repairmen



The Components of the Cooling System Require Attention and Include the Fan, Pump and Water Pipes.

to serve Uncle Sam. The writer does not wish to convey the impression that every owner of a motor car is capable of completely overhauling his machine. While many are capable of accomplishing the work there are others who lack the necessary knowledge and experience. These owners can do the preliminary work, however, and by so doing they will save much expense.

When to Use Expert.

In other words, the writer suggests that much of the work requiring experience, such as adjustments, etc., be left to the expert. It is not a difficult matter to obtain the services of a thoroughly competent repairman who makes a specialty of repairing in the garage of the owner. And it is not impossible to arrange with some expert to do the finer work on Sundays. Many repairmen are glad of the opportunity to make a little extra money to say nothing of the pleasure to be derived in bossing the novice. From the above it will be obvious that the owner can considerably reduce the cost of the overhaul.

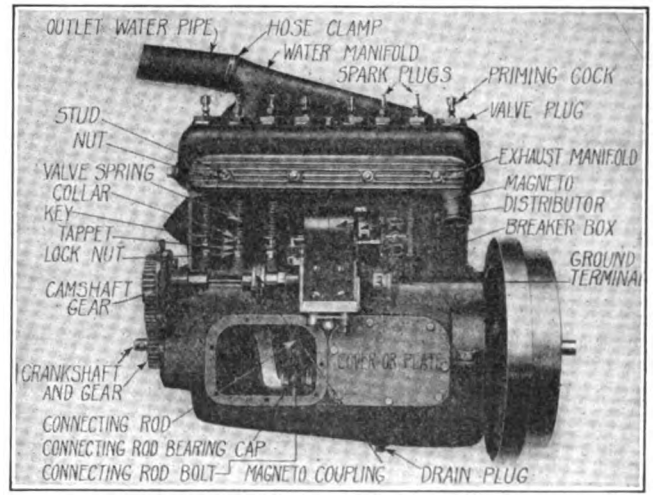
Tools, Equipment, Etc.

One of the first things to be considered by the owner attempting his first overhaul is the tool equipment. The necessary tools and equipment were fully described and illustrated in the December issue of The Automobile Dealer and Repairer and if you have not read the article it is suggested you do so. It is not always essential to purchase a big list of tools, for many times they may be borrowed from a neighboring motorist. The supplies may be secured as required. The necessary material, including new parts, may be listed during the work of pulling down the chassis, and it is suggested that these be set down as the work progresses. It will save time, in that the new part may be ordered and received before needed. This is important in these days of freight and express congestion.

Displacing the Body.

Before attempting any work obtain an instruction book and make a careful study of the chassis, learn the location of each part and how it is secured, etc. Assuming that the car has seen considerable service and a complete overhaul is to be made, the first step is to carefully wash the car, then strip it of all accessories, including those stored in the body compartments. If the winter body is to be replaced with the touring, see that the former is thoroughly cleaned before putting it away.

It is a simple matter to disconnect such parts as



A Conventional Type of Engine With Parts Lettered to Enable Owner to Begin the Work of the Overhaul.

the ignition wiring, timer-distributor, fuel connections, etc., but it is not so easy to replace these correctly; that is, for the novice. Study all of the

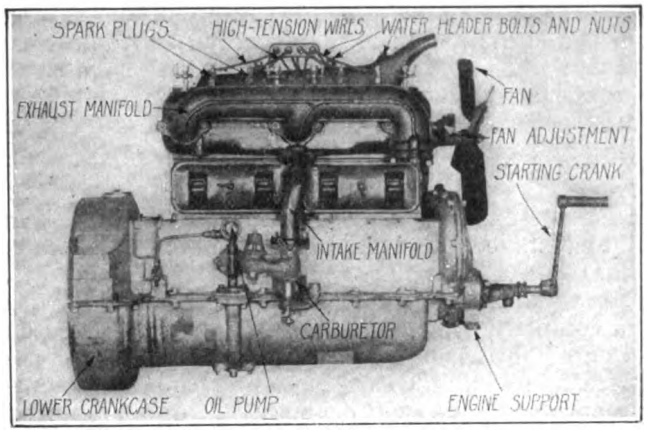
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members and note how they are connected, particularly if any must be disconnected before removing the body. Make sure that all are free before attempting to lift the body from the chassis. If the fuel tank be located in the body the unions, etc., must be disconnected, and it is a good plan to drain the tank. Lift the body with a falls and tackle and place on stands. Previous to this work flush or clean the radiator with a soda solution or a marketed preparation.

Cleaning the Chassis.

After removing the body roll the chassis out of doors. Now it may not be agreeable to work with liquids out of doors at this time of the year, but grease and foreign deposits should be removed from the chassis and one does not want the garage floor dirtied. A stiff brush and kerosene will clean all parts, but before beginning the work cover the magneto, timer-distributor, carburetor, generator and engine starter.

It is assumed that the radiator has been drained. Next study the cooling system before attempting to remove pipes or separate connections. Study all wiring connections, ignition, lighting and starting. Use the instruction book and tag any wire that you



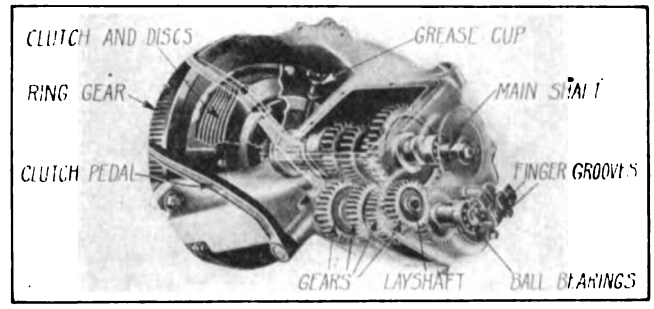
The Members of the Engine Lubrication Family Should Be Cleaned and Carefully Examined in the Overhaul of the Power Plant.

may displace. As you will doubtless displace the ignition wires, primary and secondary, tag these carefully. This will save trouble when replacing the wires.

Removing Radiator.

To displace the radiator it will be necessary to disconnect the rubber pipes of the inlet and outlet manifold or pipes, also the rod supporting the hood and connecting the radiator with the dash. Examine the method used for supporting the radiator which should be carefully handled in the removal and after. If leaking send the radiator to the expert for repairs. Examine the rubber tubing and hose clamps. The plies of the former may have become loose or separated and the clamps may be damaged. Procure new hose and clamps. Enter the sizes of these on your list of parts and material needed. The old hose can be used to determine the size required. Measure the length of each piece, then cut them in two so as to obtain the correct inside diameter. Do not consider the diameter or part slipped over the metal pipes, as these have been expanded or increased by use.

It is not practical to give other than general directions for removing the power plant as the construction varies. Some engines may be removed easily, while other designs will require a careful study of the method of retention. The unit type, the engine—the clutch and gearset—is handled



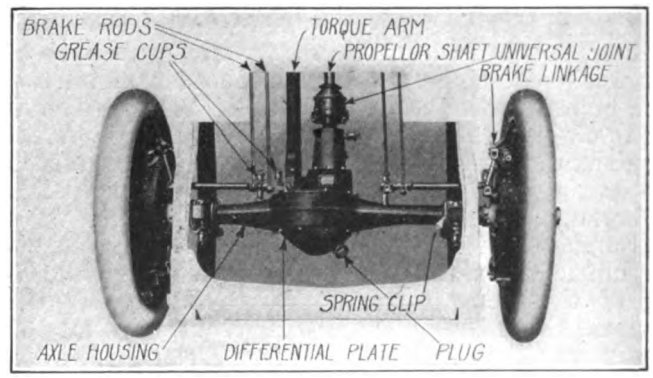
Phantom View of the Disc Type of Clutch and Sliding Gearset or Transmission.

fairly easily, especially when the gear shifting and emergency brake levers are incorporated with it. A careful inspection of the drive from the engine when the transmission is a separate unit should enable one, with the aid of the instruction book, to free the engine from all driven mechanism. One of the advantages of removing the engine to the bench or an engine stand is to facilitate the work of adjusting the bearings, etc., but in the majority of overhauls the engine may be left in the frame. This applies to those cars which have seen but little service and may not need other than a resetting of the valves, removing of carbon and minor adjustments.

Stripping the Power Plant.

Previous to the routine mentioned should be the preparation for the large as well as small parts. Clean the work bench and its shelves and have a number of wooden boxes for the nuts and bolts removed from the engine, etc. It is a good plan to paste a strip or label on each box and as the nuts and bolts are taken from a certain component, mark its name on the label. This may appear to be a useless precaution, but after one has seen the hundreds of nuts, bolts and small pieces used in a chassis, he will wonder where they all go. And you do not want any left over or be short when the work is completed. Placing the parts in a box as suggested will save time and labor.

Specific instructions cannot be given for disas-



A Thorough Cleaning of the Brake Assembly and Linkage Is Important.—Adjust Brakes and Renew the Supply of Lubricant.

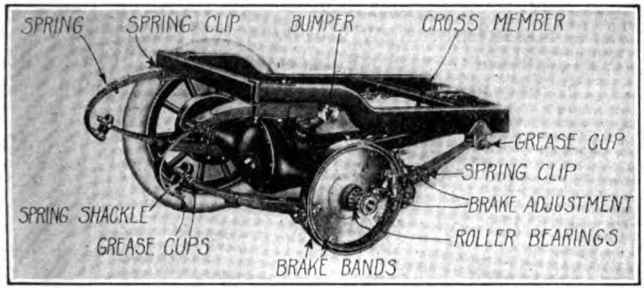
sembling each type of engine, as the design varies considerably. The components to be removed may consist of the spark plugs, priming or petcocks,

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spark plug cables, valve caps, intake and exhaust manifolds, carburetor, inlet and outlet water manifold, fan belt, fan, oil pump, carburetor, magneto, starting crank, etc.

Displacing the Cylinders.

If the cylinders of the engine be cast separately, in pairs or triplets, they should be marked before removal to insure correct replacement. This may be accomplished with a prick punch, and this tool will be found handy for other purposes. Individual cylinders may be removed easily by one person if careful, but pairs and triplet castings may require two, depending upon the strength and experience of the workman. Place the cylinders to one side for cleaning. Next remove the pan or mudshield if one be used, and before removing the lower half of the crankcase drain the crankcase of old lubricant. If for any reason the camshaft or crankshaft are to be removed, mark the bearing caps so that these will be replaced properly. If the timing gears and crankshaft gear are not marked, that is, prick punched, mark them to insure correct replacement. Mark one tooth of the driving gear and two teeth



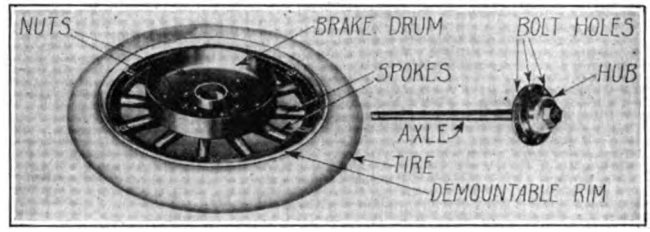
The Springs Require Careful Attention in the Overhaul.—Remove Rust and Lubricate the Leaves.

of the driven member between which the first named tooth meshes.

Pistons, Rings, Etc.

It should be stated that there are two methods used when removing cylinders. One is to displace the cylinders without disconnecting the connecting rods. This leaves the rods and pistons in their normal position; that is, the rods are not detached from the crankshaft. The other way is to remove the lower half of the connecting rod bearing or cap. When this is done the piston and rod will come away with the cylinder. Before removing the rods and pistons note which side of the crankcase the hinge of the hinged type of connecting rod is on. This is important with some engines, else the rod may be incorrectly replaced, tap the case and be the cause of a puzzling knock.

Some types of rods have what the repairmen



Inspect and Tighten Loose Nuts and Bolts and Clean and Graphite the Demountable and Tire Rims.

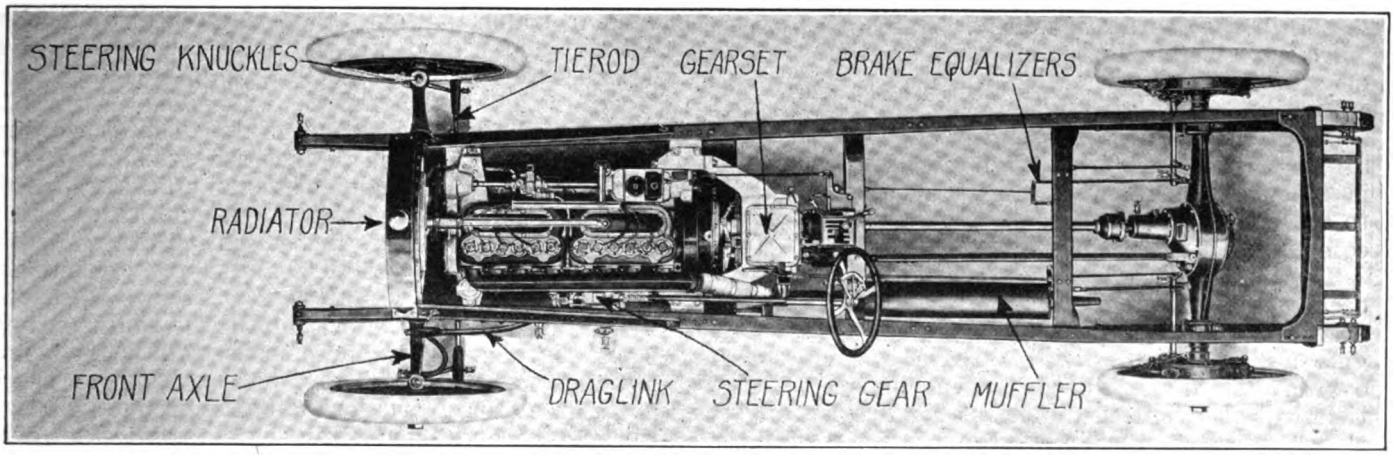
term mean bolts; that is, they are not easily displaced with the ordinary S wrench. Do not use a chisel, as it is poor practice and is the sign of a poor mechanic. Secure the special wrench or use a socket type. It is not always easy to start the nuts locking the connecting rod bolts, especially when one is in the pit or laying on the floor under the crankcase. When the engine is removed as a whole from the frame and swung in a stand, it can be turned upside down. It is then a simple matter to get at the nuts, etc. A pair of horses with their ends secured to prevent spreading, can be utilized for an engine stand. Overhauling the engine on blocks or a stand certainly saves many a backache.

Cleaning the Cylinders.

With the pistons displaced, the work of removing carbon is greatly simplified. Scrape the carbon from the tops of the pistons and do likewise with the cylinders. Displace the rings, and in so doing keep them in order so as to insure correct replacement. As the top ring is removed first, to replace simply reverse the order. Clean the piston ring grooves and the rings.

Much has been said in the favor of special rings. A great many motorists believe that the lost kick and "pep" of their engine can be restored by merely installing new rings. It can. But simply sticking one new ring or even fitting the piston with a new set will not obtain the results desired; that is, it won't as a rule. Piston rings must be fitted to the grooves of the piston and the rings must fit the cylinders. If the cylinders are not true, if the walls be worn, or what is termed oval, perfect rings cannot make up for this defect.

A great many times a good make of ring is



Showing Some of the Components of the Chassis That Should Be Given Careful Attention in the Overhaul.

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blamed by an owner as not being what it is claimed to be when the fault is in the cylinder. Therefore, have your cylinders measured, tested by an expert who has the necessary fine reading tools to do this work. Because a cylinder looks nice is no proof that it is in perfect shape. Make sure that the cylinder is right and the rings will do the work, provided they are fitted right. Fitting rings is not a job for the novice. It requires experience and the work is best left to those who know how.

The writer is frequently consulted by owners as to the advisability of reboring or regrinding cylinders and fitting oversize pistons. This work is advisable when the other components of the chassis are in good condition. It is poor economy to spend money restoring the lost power of an engine when the other parts of the chassis are in poor shape. The cost of reboring or regrinding and fitting new pistons with rings is not prohibitive. It is well worth the expense if properly done, for it is a foolish waste of money to burn gasoline in an engine that doesn't deliver anywhere near its rated power.

Cleaning Lubricating System.

As the lubrication system of an engine is most important to its successful operation, clean it thoroughly and give special attention to the filters, screens, etc. These may be partially clogged with sediment, particularly if one has not been careful to use strained oil. Look over the pump. Certain types wear and some are the cause of that annoying little tap or knock that has bothered you in the past. Clean the lower crankcase very carefully and set it to one side. If a gasket is used, enter it on the list of material needed. Do the same with other material or parts required as the work progresses. Note the condition of the cylinder head gasket, that of the intake and exhaust manifolds, and do not take any chances, but make an entry for new ones. They are not expensive.

Starting and Lighting System.

If the car has been in service but a short time, the starting motor and generator will not require attention. But if these have seen considerable service, particularly if they have not been acting just right of late, either displace them and take them to the service station of the maker or have the expert call at your garage. And do not forget to have the storage battery looked over, for you will have ample time while the overhaul is being completed. No instructions are given for displacing the battery, motor or generator, as detailed information is contained in the instruction book.

Do not attempt to smooth up the brushes of the generator nor tamper with the adjustment of the cut-out, etc. This requires an expert familiar with the system with which your car is equipped. Much of the trouble experienced with lighting systems is due to the owner imagining a trouble and trying to correct same when the fault is due to some other component of the system.

The work laid out and the suggestions made will occupy the novice for some time, and in another article the writer will describe how to time the engine and ignition as well as give instructions for overhauling the magneto and carburetor. The article will also contain directions for overhauling the clutch, gearset, rear axle, brakes, front axle and steering gear assembly.

Ed. Note.—As may be noted, no reference is made in Mr. Shattuck's article to adjusting the bearings of the engine, fitting rings, grinding valves or restoring worn parts of the wristpin, etc. Owing to the fact that these subjects are dealt with by Mr. Bagley in his article, we were obliged to eliminate them from Mr. Shattuck's discussion.

New Highways Association.

One hundred and fifty delegates were in attendance, including representatives of 22 national and State associations, ten road machinery manufacturers, 25 road material producers, 18 manufacturers of motor cars, trucks and parts, and representatives of 18 trade periodicals and daily newspapers, met in Chicago recently and formed a national organization under the name Highway Industries Association.

The meeting adopted a constitution for the association and elected officers as follows: President, S. M. Williams, Garford Motor Truck Co., Lima, O.; first vice-president, A. R. Rirst, Wisconsin State Highway Commission; second vice-president, Lion Gardiner, Engineering News Record, New York; third vice-president, S. T. Henry, Allied Construction Corporation, New York.

Headquarters are to be established in Washington, for the period of the war, to facilitate carrying out the objects of the association, which are: "To assist in co-ordinating the highways with other transportation agencies of the country; to encourage development of highways that will advance the economic life of the nation; to stimulate their use in such a manner as to facilitate and cheapen the transportation of food, raw materials and finished products, and to co-operate with Government agencies, both State and national, to the end that our highways may be of maximum service in the transportation system of the country.

Motor Trucks in Parcel Post Service.

Within a few years the Post Office Department will be the largest single user of motor trucks in America and will operate them on rural delivery routes throughout the United States.

Recently the Post Office Department has taken a deep interest in the progress of highway improvement, the development of the motor truck and methods of utilizing both. There has been a reduction of farm production owing to the draft of man power into war service at a time when it is imperative that production should be increased. More convenient transportation would stimulate production. Although somewhat late in starting, the Post Office is endeavoring to overcome this loss through the "farm-to-table" movement.

The only way to demonstrate to the producer that it is worth while to increase production is to put some visible means of communication before him, and that is by establishing motor truck parcel post routes. There are in the United States 43,295 rural mail routes and 16,000 star routes, but the average number of pieces of parcel post matter carried per day to producers on these routes is only 8 per route, and only one piece per route from producer to consumer. There is not a single parcel post route from New York out into productive territory; only one from Philadelphia, and two from Chicago. Motor truck parcel post routes will aid producers and eventually reduce the cost of living.

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Important Engine Parts Requiring Special Attention

Connecting Rods, Bearings, Pistons and Piston Rings Are Subject to Much Wear and Must Be Repaired Carefully

BY J. N. BAGLEY

In overhauling the engine it will be necessary to have a small hoist of some sort to take it from the chassis and a suitable bench or stand to lay it on while working on it. Before attempting to remove

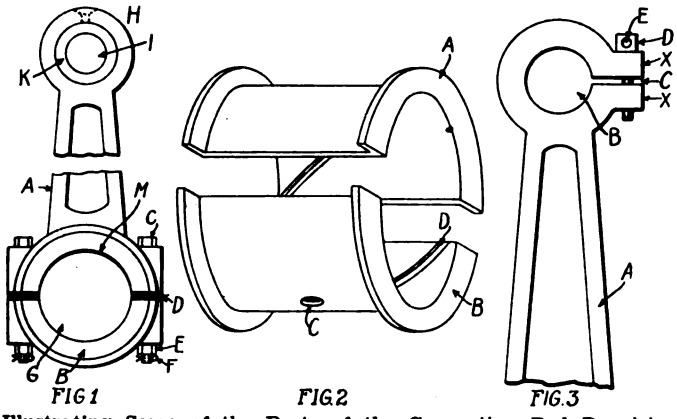


FIG 1 FIG 2 FIG 3

Illustrating Some of the Parts of the Connecting Rod Requiring Attention in the Overhaul of the Engine.

the engine, displace the radiator and place it where it will not become damaged. After removing the engine it should be thoroughly cleaned and this can be done with a brush and some gasoline or kerosene. When we speak of overhauling the engine we mean a thorough job, to take up all bearings, crankshaft, connecting rod and camshaft bearings; grind in and adjust the valves, look after the rings, remove the carbon, replace old gaskets with new, replace all worn or broken bushings, replace worn timing gears with new.

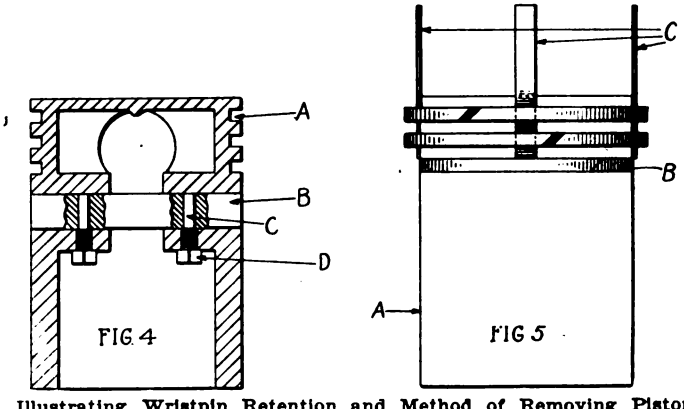
The parts that are apt to need the most attention are the crankshaft, connecting rod and camshaft bearings and the valves and rings. At Fig. 1 is shown a connecting rod of the most common type, A representing the complete rod. At B is shown the babbitt bushing which comes in contact with the polished surface of the crankshaft G. An engine that has been used for any great length of time may have what is termed a "flat" crankshaft, as shown at M. There are many ways of determining this which will be described later, but here we might mention that a very flat crankshaft should be replaced with a new one, for it is impossible to keep a bearing properly adjusted to a "flat" shaft.

Detailed instructions for removing the engine from the chassis are not essential, as all bolts, etc., are easily seen and removed. With the engine out, we will take up the fitting of the connecting rod. After removing the cotter pin F and nut E on each of the bolts holding the lower half of the bearing, the rod can be removed. There will be found a number of thin shims D, which can be removed, an equal number from each side, until a snug fit is had on the polished surface of the crankshaft G. Next tighten the nuts E and turn the rod around. It will turn gradually with the weight of the piston at H if properly adjusted. But in case it is very tight at one point and loose at another, we may have what is known as a flat crankshaft. If the bearing is not true it will need scraping to make it fit the shaft. Take Prussian blue and spread it evenly over the shaft, place the rod in position, tighten it up tight and turn it once around and remove, noting the places that are marked blue by the mixture. Take the bearing scraper and remove the high spots. Continue scraping and fitting until the bearing fits perfectly. The bearing will need no further attention, but should be marked so that it will be replaced correctly when reassembling the engine. Go over each bearing in this manner.

Next give the upper end of the connecting rod attention and note how the bearing K fits the wristpin I. If loose it will be necessary to remove the bushing K and replace with a new one, if not adjustable. In replacing the old with a new the little oil hole H in the bushing should line exactly with the one in the rod.

Referring once more to the bearing shown at B, Fig. 1, there are two general types in use, the die cast and the run-in bearing. The die cast is shown in Fig. 2, and can be removed and replaced at will. The run-in bearing, moulded to shape in the rod, cannot be removed except to be broken out. In case this bearing is broken or worn it is a good plan to return the old rod to the nearest service station and have a new one installed, as the service station has the proper equipment for doing the work.

At Fig. 2 is shown a type of connecting rod generally used. It differs from the one already described, in that the upper end B has no bearing at all, having bearings in the piston. This eye end has a screw E, which when tightened, pinches the



Illustrating Wristpin Retention and Method of Removing Piston Rings.

wrist pin B to prevent it crawling out of place and scoring the walls of the cylinder. There is a space, C, and the part XX do not come together. If they did, they might not grip the wrist pin sufficiently

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to keep it from moving. In case the points XX bear before the pin is gripped, a hacksaw blade should be run through, removing a sufficient amount of the metal to make a correct fit. When replacing the screw D a long stiff cotter key should be inserted at E to prevent the screw working loose.

At Fig. 2 is shown a die cast connecting rod bearing. Fitting these bearings is not a difficult task. Of course they may need the fitting, as previously explained. Care should be taken that the oil channels D are open and that the hole in the lower half of the bearing corresponds with that of the connecting rod. These bearings are generally of babbitt. Some manufacturers prefer a shell of brass and making the inner lining of babbitt.

After the connecting rod bearings are adjusted, look over the pistons. At Fig. 4 is shown a cross section of a piston with the wrist pin B held by two screws D passing up through the pin at C. This style of wristpin locking device is used in connection with the connecting rod having the solid brass bearing as already described. Examine the center or bearing part of the wrist pin B to see that it is not worn. If worn replace with new. They

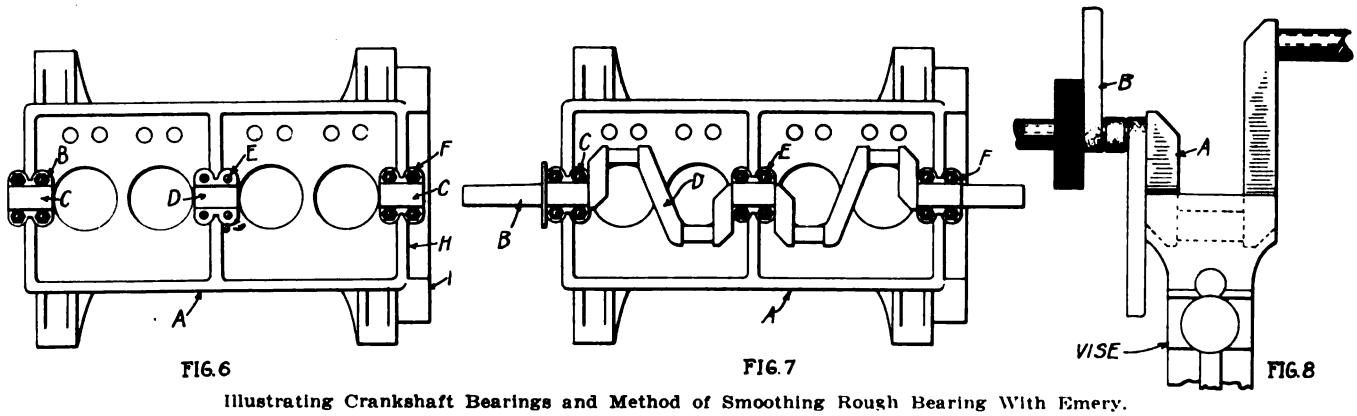


FIG. 6 FIG. 7 FIG. 8

Illustrating Crankshaft Bearings and Method of Smoothing Rough Bearing With Emery.

are not expensive. When a little loose the engine will not run quiet. Next examine the rings for wear. See if there are any black spots on the outer surface where they should bear against the cylinder. If there is, the ring is allowing the burned gas to pass and should be replaced with new ring. Remove the ring from the piston and place the ring in the cylinder and note how close the ends come together. If there is quite a little space between the ends of the ring, it will allow the compression to escape. The ring should fit the groove A perfectly; that is, it should not bind at any point so that when the loose ends are compressed they will stick and not come out. In case they do this a sheet of very fine emery cloth can be stretched over a flat surface and the ring worked over it until the desired fit is obtained. Some prefer a patented or special type of ring to the ordinary kind.

To remove and replace the rings from the piston a few strips of tin can be used, as shown at C at Fig. 5. The ring can be expanded and the strips slipped under it at three or four points. The ring can then be slipped off and on with ease. There is less danger of breaking the ring if handled in this manner than the old way of running something under one end and prying the ring off. The ring at B should fit just firm enough so that it will turn about easily after the strips C have been removed from the piston A. All carbon deposits should be removed from the ring grooves before the rings are replaced. In case the rings are a little large in diameter they can be altered with a file until they fit correctly. At Fig. 10 is shown a ring that is a trifle large; that is, when it is placed into the cylinder the ends, instead of just coming together overlap, so to speak. To remedy this, take a fine flat file and place between the ends, holding them on a level surface. Apply a little pressure to each end and draw the file back and forth until ring A, when placed into the cylinder, will have just clearance enough between the points B so that a very thin piece of paper will pass through. In case the ends are too close or the ring too large when the piston is heated the ring will expand, causing it to score the cylinder.

Not long ago the writer had a job come to the shop where the owner had put in a new set of rings, but instead of fitting them he placed them just as they came from the factory, and when they went in tight he used a block and a sledge to put them in. The result was the engine could not be turned over and the whole job had to be done over. One cannot be too careful in fitting rings. The rings and the walls of the cylinder should always be oiled when reassembling the engine.

At Fig. 6 is shown the lower half of the crankcase, that carrying the crankshaft. The crankshaft is the shaft running through the case to which the connecting rods are fastened, as already described. This shaft usually has, with a four-cylinder engine, three bearings, known as main bearings. These bearings need adjustment and attention, but not so often as the connecting bearings. The main bearings should be adjusted one at a time. For instance, the case I has three bearings, B, D, F. Remove all the caps from the bearings and note their condition. If smooth and bright, adjust. Examine the studs E and note if they are loose. Examine the camshaft bearings C for wear. Remove the old gaskets and shellac from the case. The case is now ready for the crankshaft.

At Fig. 7 is shown a crankshaft in place, but not adjusted as Fig. 7, B. With all bearings loose, begin with the back one. Take the cap from the bearing, remove a shim from each side and replace and tighten the nuts C until perfectly tight. Now try the shaft to see if tight or loose. This should be continued until the shaft just turns with a little friction. Use the Prussian blue and see how the bearing is bearing on the polished portion of the shaft. If it fits well, pass on to the next or E, and proceed in exactly the same manner, except loosen

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the one just adjusted while adjusting the one next to it. When E is adjusted loosen it and pass to F, and adjust in the same manner. Now when this is done tighten them all down tight and note how

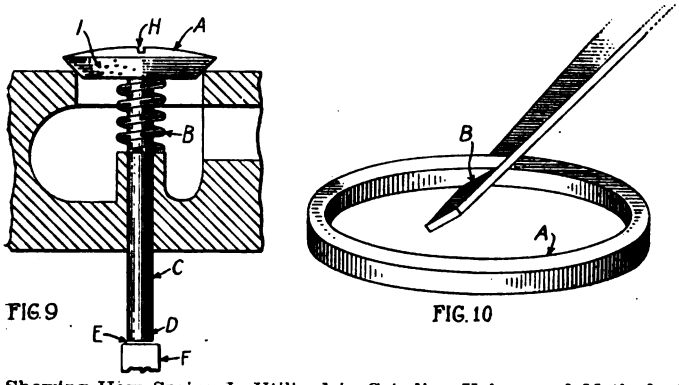


FIG. 9 FIG. 10

Showing How Spring Is Utilized in Grinding Valves and Method of Filing Piston Ring Slot.

the shaft turns. It now should turn quite stiffly, but not so stiff that a wrench will be necessary to turn it. By taking hold of the shaft with both hands on the opposite side of the center bearing, it should be turned quite easily. When this is done the connecting rods can be replaced on the shaft.

In case there is a rough spot on the shaft, it can be removed by using a piece of very fine emery, as shown at Fig. 8, B. Pull the cloth back and forth until the bearing is smooth. In case it does not have the polish desired, use pumice stone and water. Too much care cannot be exercised in fitting the bearings. Care should be taken that the oil channels do not become clogged during the operation of fitting bearings.

Next come the valves. At Fig. 9, A, is shown a valve in position for grinding. A leaky valve causes a direct loss of power, many times a missing cylinder: in fact, it affects the operation of the engine. To grind a valve proceed as follows: Place valve A into the seat with a small light spring under it, as shown at B. The spring should be stiff enough to nicely lift the valve from its seat. Place a quantity of grinding material on the valve seat and insert the grinding tool at H.

Revolve the valve back and forth, raising it occasionally and slightly rotating it. Grind until all the spots I are removed and a bright, smooth surface shows all the way around. Next wash the valve in kerosene and wash the seat. When the seat, etc., looks perfect, remove the spring B and drop the valve back and adjust the space between the push rod F and the valve stem D until a thin piece of paper will just pass between F and D. When this is done place the spring on the lower part of the stem D, locking it in place with the locking device used for the purpose and pass to the next one. Examine the guide C for wear. When worn extra air is drawn in. The intake valve guides, if worn, will cause the engine to run very irregular. In case the valve stem is worn at this point it is much better to replace with a new valve and guide.

At Fig. 2 is shown a method of forcing small solid brass bushings in place with an ordinary vise when one does not have access to a press. Open vise A up until the bushing can be started, as shown at C, into B. By tightening the screw D the bushing can be forced into place very nicely. This little kink will be found quite useful when forcing or fitting small bushings into place.

Removing the gears from the camshaft or the crankshaft is not easy, particularly without the necessary tools. A number of these gear wheels have a couple of threaded holes. They are made so on purpose. The gears can be removed with the aid of a couple of cap screws and a wrench. The sketch at Fig 12 makes plain the use of the holes. A is the wheel, B the shaft and C the screws. By screwing the cap screws down against the frame D the wheel A is gradually pulled from its sitting without much trouble or power being applied to the screws C.

CARS USED FOR BUSINESS.

Over 80 Per Cent. Thus Used, Says Car Manufacturer After Investigation.

More than 80 per cent. of the passenger automobiles in America are indispensable to business, according to data gathered in a nation-wide investigation just completed by the Haynes Automobile Co., Kokomo, Ind. A large part of the remaining per cent., it was disclosed, are essential to the personal efficiency of their owners.

The average business could not be carried on under war-time conditions, at war-time speed and with war-time economy of operation without the passenger automobile. Even the reports from those who do not use their own cars regularly for busine recognize the necessity for the so-called "pleasure car."

A letter asking for complete information regarding the individual's use of his passenger car was mailed to 1,000 owners living in all states. The names were taken at random from a list of Haynes owners, including city and rural districts. All kinds of business and all professions were represented. The letter was impartial, simply explaining the sit-

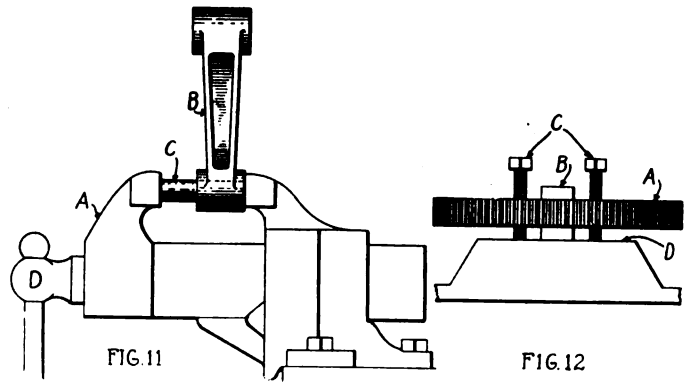


FIG. 11 FIG. 12

Showing How to Force Small Bushing in Place and a Method of Displacing Camshaft Gears.

uation and asking that a post card be filled out and returned.

Of the less than 20 per cent. who do not hold their automobiles necessary to the conduct of business, many say that without their cars their efficiency would be greatly reduced.

Cars Increasing in Savannah.

The number of cars in Savannah, Ga., is increasing, according to recent registration figures, which give that city 897 more machines in 1917 than in 1916. The total registration for 1917 is 2,310.

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Workbench and Vise Installation in a Small Repair Shop

An Article Dealing with the Value of the Two Most Important Tools in the Garage, Their Construction, and Material Used

BY W. A. MANN

The equipment of a little repair shop is something that will cause the owner as much concern as is felt by the director in charge of the equipment of a great, big plant. Proportionately, the responsibility and the outlay are just as great, and the success or failure of the little shop may actually mean more, in personal feelings, than the success or failure of a big plant, where there are many to share responsibility and whatever financial losses there may be. Let the small shop proprietor, then, take all the care he can in outfitting his place, and let him not forget that while economy in some things is most commendable and is really economy, there are forms of saving that are not saving at all. They are merely deferred losses.

Certain matters in connection with shop equipment permit discussion in detail, and others do not. There is no use trying to go into such matters as the most desirable size or shape of a shop, or the most advantageous window arrangement or anything of that sort for, as we have said already, the man who is about to open a small shop does not build or have one built to suit himself, but takes what he can get and makes the best of it.

Hardly any two of such shops are alike, so that while a few might be benefited by assuming a certain size and shape, and theorizing upon its equipment, and fitting it out to suit the assumed conditions, the majority would be left out altogether, or would find only here and there a crumb or two of information that could be turned to account in a shop that did not fit the idealized description.

Now let's get on to practical things. The shop has been selected and it has been decided whether cars can be brought in or not; it has been ascertained, if they can, that the doors are big enough and the floor strong enough; the windows have been cleaned to admit all the light that reaches them; the interior has been painted white or whitewashed; the artificial lighting has been looked to and provision has been made for putting in lights wherever the course of events may indicate that they should be placed. Apart from that the shop is a bare room.

Start With the Benches.

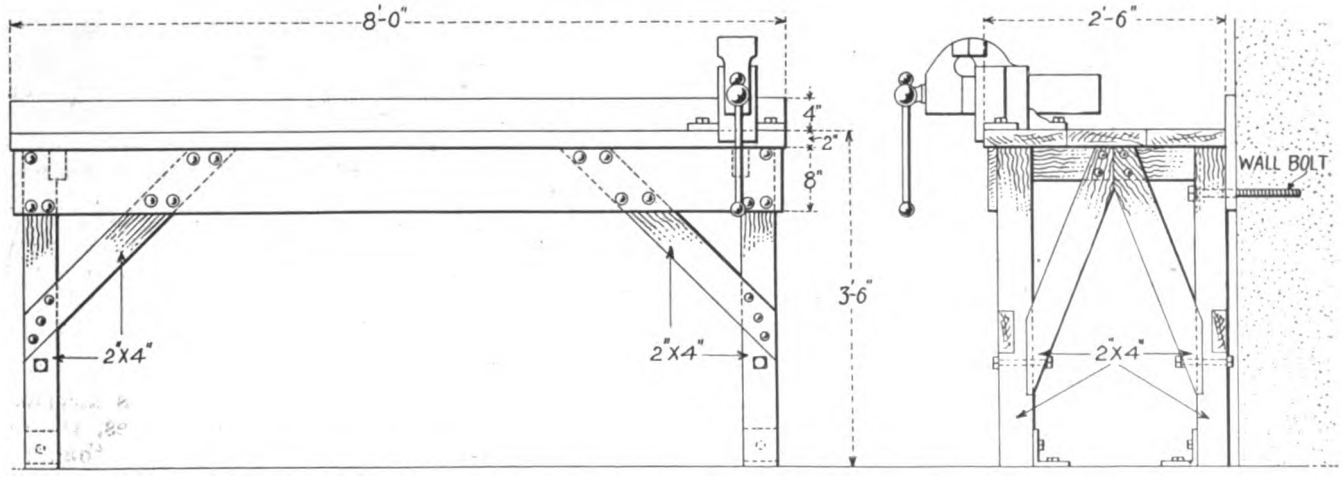
It is almost impossible to overestimate the importance of the work-benches, for the bench is, in a manner of speaking, the foundation of all hand work, such as constitutes a very large proportion, if not all, of the work of the small repair shop. There are several qualities that the bench must possess if it is to give complete satisfaction and allow good work to be done on it, but there is none that is of greater importance than solidity, both in construction and in fastening in place.

Bench Must Be Sturdy.

The bench has to support heavy weights. If it will not it is not worth calling a bench. It has to resist much pulling at parts held in the vise. It is easy to imagine the extreme inconvenience of having to humor a shaky bench when using a big wrench or a straightening bar or other leverage tool on a job in the vise, or of having to take pains to set some heavy part close to the bench supports for fear the boards forming the light top will not stand the weight. Last, but not least, the width of the bench is exceedingly important, because if it is too narrow the workman will always be more or less crowded, and the height is equally important. A man can do more work with less fatigue if the bench is the right height than if it is not.

Proper Height Important.

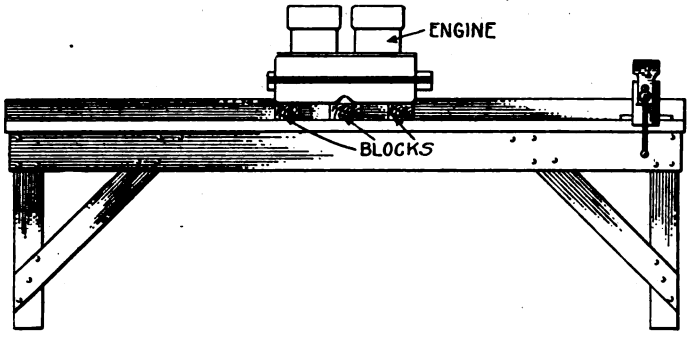
It is an old and a good rule that the height of the bench should be such that the top of the vise will be at the height of a man's bent elbow when he is standing erect. The only trouble with this rule is that the exact measurement will depend upon



Illustrating a Practical Bench for the Repair Shop and Dimensions for Constructing a Durable Design.

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the height of the man. This is something that cannot be helped, however, and there is nothing for it but to strike a happy medium. If the top of the vise is about 42 inches from the floor it will be as nearly right as can be expected for the average



Showing How Engine May Be Handled on Bench by Utilizing Blocks.—This Avoids the Possibility of Engine Bed Damaging the Bench.

run of users. The height of the bench itself will of course be 42 inches, less the height of the vise. The height of the vise usually will run about eight inches. The exact measurement can be taken when the vise has been selected.

Good Benches Pay Dividends.

Perhaps there is no better way to build a bench than to use the iron or steel legs that are furnished by a number of concerns. These are used in a great many modern shops and are found most satisfactory in every way, though undoubtedly some makes are better than others. As a rule these manufactured legs cost somewhat more than home-made wood legs, and their extra compactness, convenience and durability make them worth the extra cost; but if it is desired to economize in this direction there can be no objection, for a perfectly satisfactory bench can be made with wood legs.

Ordinary 2x4's are suitable; hard wood is better. As to how close together the legs should be placed, much will depend upon what the bench is to carry. In many shops it is the practice to put an engine on the bench, in which case it will not be wise to space the legs farther apart than about six or eight feet. In any case there ought to be substantial diagonal bracing from the front to the back legs.

The top of the bench ought not to be less than 30 inches wide at the least, and it may very well be rather wider; if too wide, however, it will be awkward to reach back. The top should be of some hard wood; there is perhaps nothing better than hard maple, though oak is hard to beat and is more easily obtained in most localities. The thickness ought not to be less than two inches.

Finishing the Work.

At the front the top may project say an inch and a half to cover the edge of an "apron" or board about 1¼ inches thick bolted or screwed to the legs. This greatly stiffens the whole bench, though if it is desired to put in drawers, the apron may be dispensed with and some other means of stiffening adopted, such as diagonals. A similar board at the back ought to project perhaps four inches above the top of the bench to act as a stop to prevent tools and other articles from rolling off onto the floor. The planks forming the bench top must be well seasoned before being put in place and must be drawn very close together. Otherwise the joints are likely to open up as the wood dries out, and such cracks are a continual nuisance. If they occur they ought to be filled with soft wood strips slightly tapered so they can be driven in, like very wide wedges, until flush.

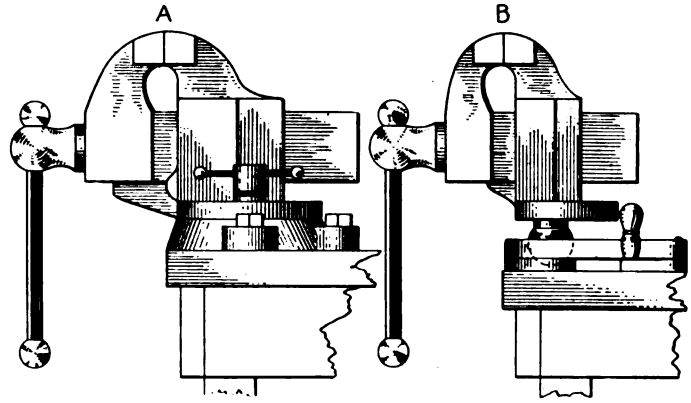
Make It Immovable.

The bench is all finished and the vise or vises in place. One of the men wants to put a slight bend in a piece of pipe. He puts the pipe in the vise, inserts a piece of round steel in the pipe, grasps it firmly in both hands and gives a powerful heave. Over comes the bench, spilling all sorts of small articles all over the floor so that the workman has to use up a lot of good time picking up again and getting ready for a new start. Then he has to figure out how he can put pressure on his pipe without overturning his insecure bench, and the job, all told, takes him about three times as long as it ought to take.

A bench for heavy work ought to be so secured that it is as firm as the shop itself. The legs ought to be secured to the floor with angle-pieces and bolts or lag-screws, but this is not by any means enough; the back of the bench ought to be bolted to the wall with good big bolts, expansion bolts, or lag-screws. The construction of the shop itself and of the bench will have to determine the exact method of fastening made use of. The object is to have the bench so solid, in itself and in its holding down, that no pressure a man can put on it will move or rack it and no weight that can be put on it will spring it or strain it in the slightest.

Bench Requires Attention.

Once a good bench has been made and placed, it is worth taking some care of. Unavoidably a bench will in time get more or less hacked and "chawed up," but this can be and ought to be limited as much as possible. We all know that the old-fashioned shop of the average kind did not care a scintilla what happened to a bench once it was put into service; but there is no reason why that idea should be perpetuated. If an engine, for instance, is to be placed on the bench it should be put on blocks, and the same precaution ought to be taken with other heavy things. There are many other ways of keeping old age away from a bench, but one example is as good as another for conveying an idea



A Good Vise, One With Swivel Base, as Shown at A, Is Superior to the Immovable Type.—The Ball and Socket Type, B, Permits of Turning Work to Any Angle.

that the average man ought to be bright enough to grasp at once.

Places for All Things.

Going back to the matter of putting an engine, for instance, on the bench, there are many very

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fine reasons why it should not be done. It is inconvenient for the workmen, it is not conducive to good work because it is hard to get at anything but one side or end, etc. In some cases possibly it may be impossible to avoid putting engines on the bench; but in most cases it will be every bit as easy to arrange to put the engine in a specially constructed horse or stand, concerning which we will have more to say a little later along. This makes more trouble at the start-out perhaps, and it may occasion a little head-scratching in case there is not much room for things; but it is difficult to think up a case where it would not be amply worth all the trouble. The same holds true of rear axle assemblies and the larger transmission cases, though small transmissions, front axles and most other car parts are less worrisome.

Best Material to Use.

Reverting for an instant to the construction of the top of the bench, it may be that local conditions make it difficult to obtain hardwood planking of the proper thickness. In this case it is permissible to make the bench top in two layers, the lower one 1¼ inch or 1½ inch pine, cypress or whatever wood is handy, and the top of inch hardwood, or whatever thickness is obtainable. The softer woods, especially cypress, are likely to shrink more than hard wood, and for this reason the fastenings for the hardwood top ought to run clear through the soft wood to the bench framing, the holes in the soft wood being large so that the boards can shrink independently.

It may be well just here to reiterate what was stated in the first of this series; that this series is not intended for the experienced, but for those who want elementary information and have looked for it in vain elsewhere. It is the fashion to assume that everyone knows certain things and to pass them over in an off-hand way, when in truth these are the very matters that require explanation. The real beginner doesn't know where to begin and you, Mr. Experienced Man, will find it very hard to tell him where to go for a start except to the School of Experience, which is a school that involves the expenditure of a great amount of time, and these are days of short cuts and of efficiency. So we will go ahead with our plan of starting at the bottom and assuming that the reader doesn't know a thing but wants to. And if that same reader should want to know something that he does not find, let him speak up and ask. He will be answered, and that as many times as he pleases to ask.

Picking Out a Vise.

Every time an old hand in the game comes to speak of a tool, no matter what that tool may be, he feels impelled to say "If there's any tool on which it's expensive to economize in first cost, it's this one!" And just about every time he will be right. It is one thing to buy a tool for use "around the house" or something like that, but a different matter when it comes to buying tools for constant use every day under conditions such that the failure of the tool means actual loss of money.

That brings us to the vise, and if there's any tool on which it's expensive to economize in first cost it's a vise! It is doubtful if there is anything in the whole shop that gets the manhandling that the vise gets, and even though vises are built to stand such service, it takes a good one to stay in the game and maintain its efficiency year after year. There are many good vises on the market and some that are anything but good; but it is perfectly safe to invest in a vise with a well-known name back of it. In the absence of experience, that is the proper course and the only safe course.

Best Vise the Cheapest.

As to price, there is really very little difference, all things being considered. For a vise of a given size, weight, type and quality the price will run about the same in all makes. When a substantially higher price is asked it is almost invariably because there is some extra or exclusive feature, a higher grade of material or something else that makes the tool worth the extra money to the man who can use the features that the extra money pays for. It is impossible for a very cheap vise to be as well and of as good material as a vise selling for a comparatively high price; not only does steel cost more than cast iron, but it costs more to work it. On the other hand, it is impossible to sell an inferior vise at the price of a good one. Competition is too keen. So when you buy a well-known vise from a reputable dealer you can be confident that you are getting your money's worth, whatever you pay.

Whether the vise is just what you need in your own business, however, is another matter, though any of the vises commonly known as machinists' vises are suitable for automobile repair service. They are all of the "parallel" type, which means that the jaws are at all times parallel, no matter how far apart they may be, as distinguished from the jaws of the blacksmith's vise, in which the outer jaw is pivoted and so its face, as it swings out on the pivot in widening the opening, forms an always increasing angle with the inner jaw, which does not move. This type of vise is not suitable for automobile repair work and therefore will not be given further consideration.

Conveniences in Vises.

The good machinist's vise begins with just the plain tool immovably bolted to the bench, with plain screw movement of the sliding jaw and both jaws faced with hardened steel. Upon this foundation many improvements have been built. In the first place, the vise, instead of being immovably secured to the bench, may be had with a swivel base, the base being fast to the bench and the vise arranged to turn at any angle, being held where desired by a screw or cam of some kind. This is a very great convenience, and though it adds 20 per cent, more or less, to the price of the vise, it is worth it, as the user will quickly discover, or as any experienced machinist or mechanic will testify.

An improvement that is a time-saver is the rapid adjustment feature. The object of this is to save as much as possible of the time lost in moving the jaw in or out. The movement of the screw is somewhat slow and tedious when the vise is opened wide or closed up again. There are several methods of working the quick adjustment. In one there is no screw, the slide working in and out freely until a convenient lever is pulled, which engages a rack in the slide and applies ample pressure after the jaws have been brought together upon the object to be held.

In another type there is a screw and a sectional nut, the nut clamping on the screw when the jaws

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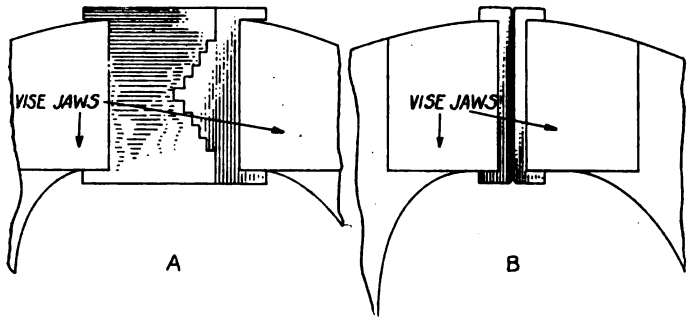
have been slid into place. There are others too. For general work it may be said that it is not invariably desirable to have this quick action. Often it is highly desirable that the vise should be used as a sort of press, in which case the continuous screw arrangement is the best possible.

Removable Facings.

It is now quite an ordinary matter for the jaws to have removable steel facings, for two reasons. One is that the steel facing, getting the brunt of the wear and tear, will need replacement before the rest of the vise is worn out, and a removable facing is easily replaced. Another, less common, is that in some cases jaw faces of different shapes can be used, odd-shaped pieces thus being more easily held. A variation of this plan is to make one of the jaws so that it will swivel horizontally, with provision for holding it in any position, which works very well indeed. One type of vise has, instead of the swivel base, a big ball-and-socket joint, so that the vise can be turned to any angle, any position at all. This is like some other things; it is exceedingly useful in some cases and no use at all in others; in general work it has little or no advantage over the plain swivel base vise.

Convenient for Handling Pipe.

Almost any machinist's vise can be had with attachments which make it very good pipe vise, and



Useful Vise Attachments: A, Pipe Holding Jaws for Securing Tubes, Etc.; B, Caps or Fittings for Holding Brass, Copper or Aluminum Parts.

this is a very good thing in automobile work, where there are many pipe jobs and many round rods to be worked on. Without doubt the most convenient arrangement is to have a regular pipe vise, and a shop of any size will actually find such a tool a necessity; but for the small shop just beginning life a pipe vise attachment for a machinist's vise will answer all purposes and give great satisfaction.

Types Required.

Now for a little practical talk on the actual selection of a vise, now that we have gone over a few, though by no means all, of the features of modern vises. There is nothing worse than to go to work with a vise that is too small and a vise, like any other tool, will fall down sooner or later under abuse. But too big a vise is very clumsy in doing small work. What are we going to do? The answer is that if possible it is much better to have at least two vises, one a big, heavy one with 5½ or 6-inch jaws, which will defy almost anything a man can do to it, and the other smaller, with say 3½-inch jaws. The last, while a good, husky vise, will not be too heavy and slow for moderate sized work.

And let us hasten to add that there really ought to be a very small vise, one of the kind that can be bought for a couple of dollars, for holding small light parts, such as carburetor, magneto and other comparatively delicate parts. It will be found advisable to have both larger vises of the swivel base type, and it will also be found advisable to have pipe-holding jaws for both. The reason for this last is a good one.

Need of Big Vise.

The large capacity of the heavy vise is handy for taking in big rear axle tubes, for instance, which would overtax the small tool, and the workman would feel secure and safe in putting on all the pressure the job might require. But when it comes to holding something like a pump shaft, or small pipe, the big tool would be in the way and unnecessarily bulky, which would results in loss of time. In fact, sometimes it is not possible to do a small job in the big vise or a big one on the small vise. And there you are! If it is absolutely necessary to get along with one vise a compromise can be made on one with say a 4-inch or 4½-inch jaw. It is a small shop indeed, however, that will not need two vises during the busy season.

The steel facings of a vise are necessarily hard, and they are scored or roughened to give them a firm grip. This is hard on a finished metal surface, and yet finished parts often must be firmly held. For this purpose it is customary to fit over the jaws shields of softer metal, such as brass, copper or lead. Even hardwood strips may often be used to advantage, especially in holding brass, copper or aluminum finished parts. Brass or copper vise caps are much cheaper to make than to buy, generally.

Making Vise Caps.

To make a pair of caps, take two pieces of brass or copper, the latter is usually the softest, a trifle longer than the width of the jaws and about twice as wide as the depth of the gripping surface of the jaws. Clamp them in the vise so that the part gripped will just a little more than cover the steel facing separate, and bend the upper parts back and gently hammer them down over the tops of the jaws. Then heat them until they are a dark red and plunge them into cold water, which has the effect of softening them, the hammering and working tending to make them hard.

Be extra careful not to get too much heat if using brass; brass sometimes will almost fall to pieces when a little too hot. Just a good dark red is sufficient. The cooling in water is not absolutely necessary, the metal will be quite soft without it, but it helps some. It should be remembered that continual pressing or striking or bending brass or copper gives it a hard surface. This is easily proved by taking a piece of soft sheet brass or copper and hammering it lightly all over on both sides, when the metal will be found to be quite springy, and if the process is continued in the proper way a very good spring can be made. This is the principle used in making spring-tempered brass and copper, the working being done by rolling the sheets under very heavy pressure.

Caps Will Harden.

After the vise caps have been in use for a time, bearing the foregoing in mind, it is readily understood that they become hard on the surfaces and require annealing by heating and cooling. Another thing to consider is that the soft metal picks up

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and holds particles of harder metal, such as filings, chips, etc., these being embedded and perhaps scratching the finished work when pressure is applied to the vise. Dressing up the caps, smoothing their faces and annealing will dislodge most of these.

Lead caps for very fine surfaces are made in the same way from sheet lead, but should be rather thick—say not less than 3/16 inch or, better yet, ¼ inch. The lead does not harden in use like brass or copper, but it picks up hard particles much more easily and for this reason care should be taken to see that they are kept clean, and when a nice piece of metal is to be gripped between them they should be examined to see that they are free from foreign metal.

Installation of Vises.

The first thing to bear in mind when installing vises is that they may be called upon to hold pieces that may extend a considerable distance in either direction. Therefore as much room as possible should be provided. Bolts used for holding down the bases should be as large as the holes will take. The best place for a vise is close to a bench leg, so that there will be good solid support under it. The advantage of this is especially noticeable when doing anything requiring heavy hammering—heavy chipping, for instance. The feeling of a springy bench at such a time is extremely unpleasant to the workman and reduces the efficiency of his tools appreciably.

How to Locate Pipe Vise.

If a pipe vise is included in the equipment of the shop it should be placed where there is plenty of room on both sides of it so that long pieces can be readily gotten in and out. Don't forget that a shop that starts out to do automobile work can do other work as well, and there is no reason why the profit on a bit of pipe-fitting or anything of the kind should be turned down. Therefore in putting in tools bear in mind that there are other things in the world besides automobiles. A good stout pillar is a good place for a pipe vise, which can be set with its base vertical instead of horizontal if necessary.

Ed. Note.—This is the second of a series of articles by Mr. Mann dealing with the equipment, operation and maintenance of the repair shop. The third article will appear in an early issue.

DODGING THE BUMPS.

Why Some Drivers Obtain Good Car Service Without Big Depreciation.

BY JAMES F. HOBART, M. E.

The writer recently stood for a considerable length of time on a street crossing and watched carefully to see how some car drivers "bumped the bumps" while other drivers seemed to avoid all the rough places, or at least they dodged the bumps almost completely.

After considerable watching, it was seen that some men seemed to know just where each bump and rough spot was located, and this, too, when the driver chanced to be a perfect stranger in town, perhaps having never driven a car over that crossing before.

Some street crossings are nasty spots to negotiate and when such crossing also contain branching-off street car tracks then it is much harder to drive a car across without receiving a shaking up. By watching several drivers as they came, both the "bump" and the "non-bump" ones, it was seen that the men who escaped a shaking were keeping close watch of the trolley wires, any branching of which could easily be seen for some distance. By thus watching the wires the driver was enabled to cut down speed still more when car track crossings were to be taken. The careful drivers also slowed down at each and every street intersection, so as to have the car under complete control and were thus able to dodge any rough spots, water-sheds, etc., which might be present.

Critical Car Speed.

The writer has long noticed that of many makes of cars passing over the same rough collection of "bumps," all cars do not vibrate alike when making such passage. This is not only possible but an actual fact. The scientist will tell anybody and everybody that anything and everything at any time and all the time is in a state of continual vibration, and that anything and everything has a certain rate of vibration whereat it shows up at its best, be it light, man, tree, trolley car or automobile. Therefore, it is to be expected that when a car is driven over a rough bit of road it will vibrate considerably. But, Mr. Car Driver, haven't you found that any car, traveling over rough roads at various speeds, will seem to pass over easier and smoother at a certain speed than it will pass at any other speed either faster or slower?

The writer has had that experience and there seems to be a certain speed in miles per hour, at which a car will run much more smoothly over rough roads than it will run at any other speed. Some of the drivers who passed the "bump corner" were evidently well aware of this speed fact other drivers seemed to know nothing about it.

Nevertheless, the easy riding critical speed of one car is seldom like that of any other car. Each driver must find out for himself the particular speed at which his car will negotiate most smoothly a rough piece of road, and it is suggested that the manufacturer of each car do some experimenting in that direction so as to advise purchasers of the particular speed at which the car will take rough roads with the least vibration.

It would seem at first sight as though the slower the car runs over rough roads the smoother it will ride. Probably this is true to a certain extent. But the point which the writer wishes to bring out is that somewhere between 10 and 30 miles per hour, any car will ride smoother over rough roads than at any other speed, above or below, and that this critical speed should be sought for, found and used upon rough roads.

Should a car be found to run smoother at 20 miles an hour than at 12, then by all means use the 20 mile rate in passing rough crossings. It will of course be harder upon springs and tires but the engine will be saved from that much vibration and will last longer as will the rest of the vehicle superstructure.

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Need for a Standard System for Recording Truck Operating Costs

* BY S. V. NORTON

Perhaps one of the most urgent needs of the motor truck industry today is for a standard system of keeping track of truck operating costs. A large number of truck operators are either not making or not saving the money they should from their trucks. Many of them are actually losing money. Why is this? Simply because truck owners have been too busy delivering their goods to ask themselves, first, "What does it actually cost?" and second, "What ought it to cost?"

With the necessity for war time economics the need for keeping track of motor truck costs is more urgent than ever. In the past many cost systems have been devised and distributed to motor truck owners and while these systems were generally compiled by experts and were complete, they were not uniform and different systems treated various items of expense in different ways.

Standard System Needed.

A standard system setting down a uniform method of figuring truck costs would provide a common language by which the experience of all truck operators in the country could be related and understood.

It would unlock a great storehouse of information which is at present closed to the truck owner.

Any individual system, however well designed, cannot serve the motor truck industry adequately so long as several other cost systems, which also may be well designed, are in existence. The difficulty comes from a lack of uniformity in the treatment of various items of expense. Truck owners who use systems which have been compiled by authorities on motor truck accounting or by general expert accountants, and which are generally complete, show results which are not subject to comparison because of varying methods of computing identical items. There are, for instance, at least four methods of figuring depreciation.

Cost Data Varies.

Two truck operators, A and B, use systems devised by competent accountants, A's cost system provides that depreciation shall be figured at 20 per cent. a year, charging off the entire cost at the end of five years, but B's system declares that depreciation must be figured on a mileage basis, allotting 80,000 miles as the expected life of the truck. Both operators use cost systems devised by experts, yet the difference in computing this one item alone may amount to $100 or $200 a year.

If all or even the great majority of truck owners began to figure depreciation according to the standard formula, an enormous gain would be accomplished, for a common denominator would be established by which one truck could be compared with a thousand trucks in respect to this item.

Factors in Cost System.

A well conceived motor truck cost system should reveal:

Number of trips and customers or deliveries.
Total and average loads in units.
Round trip distance and total miles traveled.
Unit-miles.
Miles per gallon of gasoline and of oil.
Standing time at plant in hours and minutes.
Running time in hours and minutes (including stops).
Average loading time per trip.
Average speed in miles per hour.
Estimated running time per mile.
Estimated time per customer's stop (in minutes).
Cost per day (at work).
Cost per mile.
Cost per mile and per unit.
Cost per unit mile.

Now suppose a standard system were adopted and widely used which would enable a great many truck operators to compute these items in the same way. The benefits to truck users would be enormous. A comparison of figures would bring to light many possibilities of economy, as well as many causes of waste. Expensive methods would have to go, time-saving and money-saving ideas would spread throughout the truck using public.

Tire Records.

Take the matter of supplies. A great deal of doubt exists today in the minds of truck owners as to which oil, which tires. which accessories of all kinds are the best. Many owners admit there seems to be no way of finding out. Suppose now that a considerable number of truck owners kept their tire costs in the same way.

The reports from dozens, perhaps hundreds of truck owners, rendered in a uniform way, would tell a convincing story. They would establish proof where heretofore there was guess work.

Repairs and Maintenance.

Consider the matter of maintenance or repair. Every reputable truck maker is searching constantly for information which will enable him to perfect his product. The world is his laboratory, and he would like nothing better than to receive reports from all his customers which would describe the shortcomings and lay bare the weak points of his truck. Unfortunately this information is not yet available to him, except in fragmentary form. And even in those rare cases where he does receive the complete history of an installation, the story is apt to be, as it were, in a foreign language, which must be translated or interpreted before it can be of use. The same may be said of the maker of parts.

What former attempts to establish a standard cost system have lacked, seems to be abundantly supplied in the movement now well under way by the Truck Owners Conference, Inc., at Chicago. It is hoped that this movement will result in a cost system being approved which may fully take the title of a standard system. The movement is by far the most encouraging sign of action toward this end that the industry has yet seen, and as such deserves the support of every truck owner, manufacturer and maker of truck parts.

*Manager of truck tires sales of B. F. Goodrich Rubber Co.

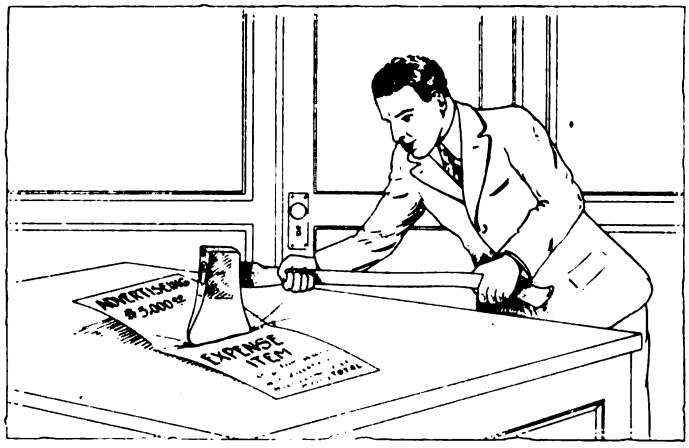
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Cutting Down Expenses Without Handicapping the Growing Business

Analyzing the Various Items Which Go to Make Up the Disbursement Columns of the Ledger and Considering Those Which Cannot Be Cut

BY FRANK A. FARRINGTON

How can I reduce expenses? That is always a practical question, and it has a special fitness at this time when the tendency is for expenses to increase steadily. The cost of doing business continues to go higher until it looks as if it would soar above Gilderoy's famous kite. And just at this time when our business needs more money, the Government wants more of our financial help and we want to give it, but if we contribute more to the support of the war, we have to get that money from some source, so it looks as if it would be necessary for us to cut operating costs to the bone.



Cutting the Advertising Appropriation in Two Is Mighty Poor Economy.

Where to Cut.

The question is where to cut. We have to bear in mind that there are many expenses that cannot safely be cut. Take advertising, for example. The dealer who is doing considerable advertising finds that it runs up into money pretty fast. When he looks over the expense items to see which ones can be cut, he sees this advertising expense sticking up above the rest and he does not see immediate cash returns from it. It looks as if he could stop advertising for a few months without losing anything, because, as he reasons, "Everybody knows where my garage is." So he lops off the advertising expense and thinks he has saved a lot of money. He does not realize differently for a few weeks, and he may even lack the perception to see that the fact that his business is so much less this summer is due to the absence of advertising.

Advertising Is Necessary.

Advertising is a good example of a class of expense that cannot be spared. If you want to save money on advertising, the way to do it is not by ceasing to advertise, but by advertising more efficiently and more economically. At such times as this, you should do more advertising rather than less. It is more and better advertising that is going to keep your business up and enable you to take in more money with less running expenses, or without increasing costs.

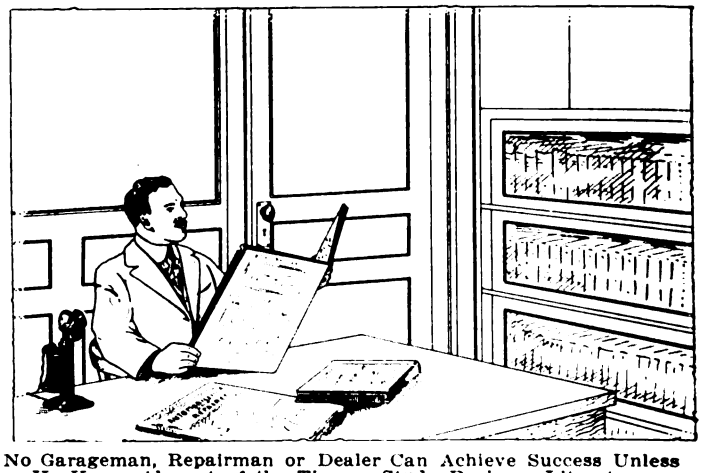
Run Good Copy.

Use more care in selecting your advertising medium. Get better position in the local paper and see that they keep you in that same position each issue, and instead of running the same advertisement week after week, put in a new one every time. People are not going to read old advertisements when they would scorn to read the same news items or stories a second time. Do you think your advertisements are so much better worth reading that people will enjoy repeating the reading? Yes, I know, there is that argument that people who do not see the advertisement the first time may see it the second time, but those people would see the different advertisement just as well. Spend more time, too, in preparing your advertisement. Get up the very best copy you can make. It costs you just as much to run a poor advertisement as it costs to run a good one.

Keep Signs, Etc., Clean.

Take advantage of all the help the manufacturer is prepared to give you in the way of advertising matter for the things you sell. This advertising matter is free and it will pay you well for its distribution, which will cost little or nothing. Use the good signs and show cards that are sent you. Take pains to put them up well where they will show and when they get soiled, take them down and put up fresh ones.

Without going any farther into the matter of saving money on advertising, it ought to be plain that it can be done without reducing the amount or the effectiveness of the advertisements. Just use more care, more intelligence, more pains.

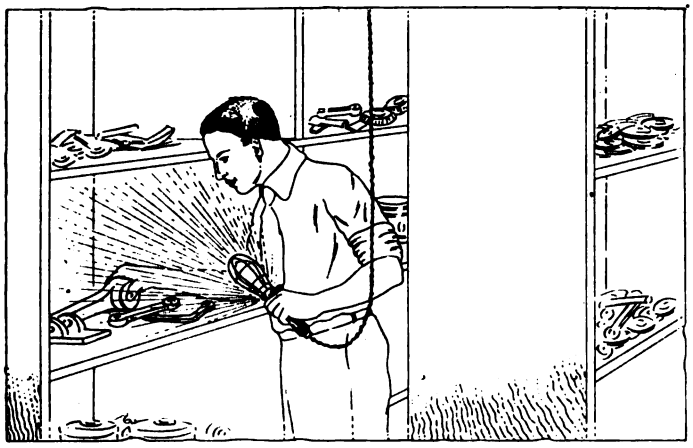


No Garageman, Repairman or Dealer Can Achieve Success Unless He Keeps Abreast of the Times.—Study Business Literature and Read The Automobile Dealer and Repairer.

You cannot get along without heat and light any more than without advertising, and if you are to

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create a good impression, you do not want to skimp on these items any more than the proper conservation of fuel demands. Just as in advertising, the way to save along these lines is by efficiency rather



Dark and Poorly Arranged Stock and Store Rooms Means a Loss of Time and Money.—Stock Room Mistakes Are Costly.

than by main force. Instead of trying to get along without enough heat or light, see how you can develop the amount you need with the least possible expense.

Heat vs. Waste.

Enough has been said by the Government officials about efficient use of coal and heat so that further suggestions ought to be unnecessary. We all ought to have sense enough to see that heat is not wasted by needlessly open doors and windows, by heating a room we do not need to use, by keeping the garage at too high a temperature, by running up steam and getting things too hot so they have to be cooled off by opening the doors. Efficient heating methods will make it possible for everybody to have all the heat necessary. It is the waste of heat and fuel that makes the trouble.

Economical Lighting.

It is just the same with light. Wasted light counts nowhere except on the debit side of the ledger. Light in places where it is not needed, too much light in some places and not enough in others, old incandescents where modern tungstens should be used, tungstens that have been used until they do not return as much light as they consume current, lights left going in cellar or stock room or elsewhere where used only occasionally, windows where the lights throw all the illumination out on the street instead of illuminating what is displayed in the window; all these count for needless expense that can be reduced or eliminated with little trouble.

So much for light and heat, and at the best I can only hope to set you thinking so you will go around and investigate once in a while conditions that may be left too much to employees whose intentions are good but who are more or less careless.

Employees and the War.

We are all going to continue to lose employees as more men are called to the colors. This may bring about temporary reductions of the payroll, but that will not necessarily mean reductions in expenses. If the same work is to be done with less men, those men will have to work harder and if they are good men, they will be willing to put in overtime and they ought to be properly paid for it, but in order to reduce costs, there should be watchfulness to see that the employees are inspired with a desire to accomplish something rather than merely to put in time.

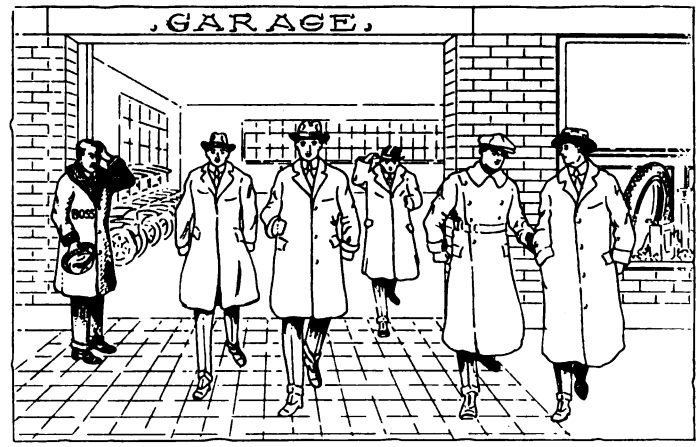
It will reduce expenses to get your men more interested in the business so they will want to be efficient and the same result will be accomplished by getting them interested in their own success instead of merely in their pay envelopes. A profit-sharing plan based on giving employees a percentage of the gain in the business or in the increase in net profits, will get the employee and the cash register tied up together.

The One and Two Man Job.

In plenty of shops there is idle time due to one man working at a two man job or two men working at a one man job. It is because of his ability to prevent waste time that a boss earns his pay in handling a gang of men. You may not have a big enough business to employ a regular shop boss, but you can yourself watch the laying out of jobs, or make one man superintendent and thus keep work planned in advance so there will be no waits between jobs and no time spent in discussing what to do next or how to do it, and no instances where one man thinks it is easier to have a helper for certain parts of his work and so keeps one around him when useful only half time.

The shop where slack methods prevail, and there are many of them, follow those methods only because the head of the concern has not developed a system that eliminates them. It is scarcely to be expected that the workmen will develop their own systems, no matter how good men they may be. A good man will leave a shop where inefficiency prevails. If your shop is run the wrong way, you may be sure it will have the wrong kind of men in it. No other kind will stay.

The care used in arranging the work in a garage will be the means of making many a job profitable or unprofitable. To follow absolutely the order in which the work comes in may seem the desirable thing, but it may mean two jobs calling for the same machinery or tools at the same time and it may mean men standing around waiting. The work must be so ordered that there will be no waiting inside the shop, even



The Draft May Reduce the Working Force, But It Does Not Necessarily Mean Reduction in Expenses.—Watch the New Workmen to See They Produce Results.

if it means a little more waiting outside, on the part of the customer. A job that does not pay a profit is not worth much to you.

Wherever you can reduce the amount of labor

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done by hand by the introduction of modern equipment or new machines, that offers a chance to reduce operating costs and to make it possible to get along with the less number of men available. A machine will do the work for less money than the man, so consider carefully whether there is not some way in which you can use more or better machines. Study the pages of your trade journal to find the advertisements of such mechanical helps as you might use. Write to manufacturers for information. Don't be afraid to take up by mail or with a salesman the consideration of installing some new machine. It is your business to find out all you can about every new labor-saving device in your line.

Doing business the way you always have done it and doing mechanical jobs the way you always have done them may give reasonable satisfaction to your patrons, but you want some satisfaction left for yourself, some pecuniary satisfaction in the form of a net profit from the business. The machinery of garage work is all the time being improved with a view to making it possible for the owner to compete on a profit basis with constantly growing competition in his own and other towns.

The efficient way of doing things will prove to be the cheapest way in the long run, so keep in touch with the latest improvements in mechanical methods, keeping your shop and your employes up to date.

Stock Room Mistakes.

Methods of storage have something to do with keeping down expenses. Some stock rooms, for instance, are veritable cubby holes in the dark corners of which repose stock long forgotten and duplicated and reduplicated in order after order. A stock room may have shelves or bins too large and deep for some of the kinds of stock kept there. A deep shelf permits some stock getting shoved back out of sight and more is ordered while plenty is still on hand. Darkness in the stock room is sure to cause patrons to be sent away empty handed when the parts are right there, but out of sight. A few good lights put where they will light up the dark corners will help the stock room question a good deal. Economy requires the careful use of such lights and that they be not left turned on, but it requires their presence.

If I had to get along with a dim light in the office or in the stock room, I think I'd take it in the office. There I would at least concentrate what light I had where I needed it. Stock room mistakes cost more than office mistakes, because they do not get found out and corrected. Dark corners anywhere work is done or supplies kept are sure to create expense.

In addition to light in the stock room, there should be system there, of course, a place for everything and that place clearly indicated so the right thing can be found in the least possible time. If a man who is drawing five dollars a day has to spend 15 minutes looking for something he ought to have found in one or two minutes, you can figure out for yourself how much it has cost you to lack system in that case.

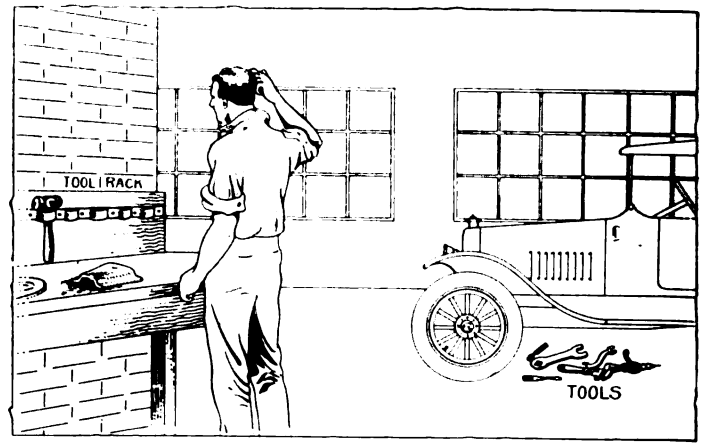
Value of System.

It is the same way with tools. If the tools all have their places where they are returned after use, there is much less likelihood of their disappearing, to say nothing of the advantage of being able to get the thing wanted without having to go around and look for it under every car in the shop. System, which is nothing more than order, will help cut down expenses. Lack of system can be counted on to boost expenses.

It ought not to be necessary to call attention to the fact that taking proper care of equipment makes it last longer and cost less in the long run. You condemn the motorist who brings in a car which has been neglected and not overhauled in an undue length of time, but are you as careful as you ought to be about overhauling your own machines and keeping everything working at its best and neither abusing nor neglecting? If you are not, you can find in that fact a cause of needless depreciation—and depreciation is expense.

Look Up Customer's Credit.

Then there is the matter of accounts. Accounts lost are money lost, and it comes out of the profits—goes into the expenses. It is a safe bet that you can reduce the number of your uncollectible accounts by using more care in your risks. You don't have to trust everybody who asks for credit, even if the car is repaired and they are ready to take it away. You ought to hang on the wall above your desk the motto, "Learn to say 'NO'" and you ought to keep one eye on that when Mr. Slowpay tries to get away with $100 worth of work and material without putting down a cent of money.



When a Workman Has to Hunt for Tools He Is Wasting Time and Money.—Lack of System in the Repair Shop Boosts the Expenses.

When a car comes in for repairs you have time enough to find out about the credit rating of the owner, by asking the bank or somebody else. Don't take chances. Chances are what cause losses. Suppose the poor pay patron doesn't like to be refused credit, if you lose his business by refusing to trust him, you gain rather than lose by the means.

Get Your Money.

Then delay in collecting costs money. When a man owes you money, see that he is given early and frequent chances to settle. It's your money. You are entitled to it. If he gets mad, you have found him out at least.

This matter of cutting down expenses is a matter of all around efficiency. We have reached a point in garage management when the inefficient manager is not going to be able to continue in business as long as he once could. There may have been a

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day when almost any mechanic could open a shop and manage to keep going and make a living. That day has passed. Today the garage manager who does not study efficiency in all departments will find himself crowded out of business.

What War Is Doing.

War has helped to make the more inevitable a condition that was on its way to us before—the survival of the fittest. The unfit business man is going to be crowded to the wall and nobody is going to be seriously to blame but himself.

Study the business literature and the automobile trade papers and the books that apply to your business just as a professional man studies the textbooks of his line of work. The more you learn about your business, the better able you will be to cut down expenses without causing a resultant cut in the receipts.

Developing Truck Efficiency.

In view of the shortage of gasoline in England and the necessity of relieving the traffic on railways, it has become necessary that all privately owned motor trucks and steam trucks should be utilized to their fullest carrying capacity, and accordingly the transport section of the Ministry of Munitions has arranged a scheme of mechanical transport control to cover the West Riding of Yorkshire. A public notice states that the object of the scheme is to provide loads for empty journeys that trucks are at present running and to provide loads for trucks not fully employed within a radius of about 20 miles of loading point.

The charge, which commences from the time the truck arrives for loading until it is released, ranges from 5s. ($1.22) per hour to 12s. ($2.92) per hour for gasoline trucks of 10 hundredweight up to five tons capacity, 9s. ($2.19) for rubber-tired steam trucks up to five tons capacity, and 6s. ($1.46) for steel-tired steam trucks of a similar capacity. Trailers will be 3s. (73 cents) per hour extra, and special rates can be arranged for regular journeys on long periods. Charges will be collected by the Ministry of Munitions, who accept responsibility to pay the owners, after deducting 5 per cent. from the amount received to cover expenses of administration, and traders within the prescribed radius who require to forward goods should supply full details of their traffic and the points between which it has to be conveyed.

Chambers of commerce and traders' associations in the area have undertaken to give the scheme all possible assistance; and at a recent meeting of the motor haulage contractors in the West Riding of Yorkshire they decided to accept the scheme, as it was felt that all traffic would soon gravitate into this official channel on account of the cheaper rates. It was also realized that as the supply of gasoline is controlled, and in the last resort the Ministry could utilize Army Service Corps wagons, the contractors could, by adopting the scheme, maintain their industry and stand in a better position to obtain supplies of fuel and machine parts.

Building Roads for Cars.

The use of motor cars in Hongkong is comparatively limited, but at present there may be said to be almost an automobile boom in the colony. The Colonial Government, recognizing the increased demand for automobile roads as a means of healthful recreation, and also as a means of opening up residential sections not now in use, has announced a comprehensive policy of road building and road improvement, which in fact already is under way. Several enterprises are on foot in the colony which demand increased and improved means of transportation to and from the outlying districts. The wealthier Chinese residents have taken to automobiling most enthusiastically, and are by far the best customers of the public garages. The use of automobiles by private owners also is generally on the increase.

During the past few months the number of cars in use has grown rapidly, there are more garages, and a good volume of orders has been placed. There are now licensed in the colony 125 motor cars and 118 motorcycles, compared with 105 cars and 91 motorcycles in December, 1916. A canvass of the dealers and garages indicates that between 25 and 30 new cars have been ordered, all from the United States. Most of them are popular-priced machines, but there is an increasing demand for the higher-grade ones. An order for 11 placed by one garage included five of high grade. In spite of excessive freight rates, the demand promises to continue for some time, although the market may easily be overstocked.

Alcohol for Engines.

The Commonwealth Advisory Council of Science and Industry of Australia has just published the report of its special committee on the question of alcohol fuel for engines. Gasoline sells out there at 65 cents a gallon. The committee took up the records of research on this problem and found that alcohol had been used with success for a number of years in Germany in specially designed engines. They report that any ordinary gasoline engine may be run on alcohol except at the start and that the consumption of alcohol in such engines is about 50 per cent. greater than that of gasoline per horse power developed. In specially designed alcohol engines the consumption of alcohol per horse power is not greater than that of gasoline. The changes needed in the design of an engine to use alcohol are:

Increased compression from about 75 lbs. to 180 lbs. per square inch, preheating of fuel, air, or mixture, and increase in area of fuel supply pipes.

In starting the carburetor must be preheated or an arrangement made for the use of a little gasoline. Exhaust gases preheat after the start. The committee decided to turn its attention to stationary engines rather than to motors for automobiles because of starting difficulties and the advantage, as demonstrated, that is found in slow speed engines with a long piston stroke. The successful alcohol engines in Germany were almost wholly of this type. The records available indicated that comparatively little work had been done on engines suitable for motor car engines.

The following yields are reported in gallons of alcohol per ton of raw material used: Corn 80-83; barley, 65-70; wheat, 80-85; potatoes, 15-24; beets, 12-16; apples, pears, apricots, and peaches, 9-14; gum tree 12; soft wood sawdust, 20; grapes, 18; molasses, 65-70.

A benzol-alcohol mixture was considered without recommendation.—The Little Journal.

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Considering the Factors Making for Long Tire Life and Easy Riding

The Influence of Size, Type of Construction and Inflation Pressure—The Possibilities of Pneumatics With Large Cross Section

BY W. S. WOLFE

Perfect riding qualities would be experienced on an even, smooth roadbed under which conditions the tires and springs would not be brought into play. Conditions only approximate this at best so tires and springs are constantly acting to "iron out" the irregularities of the road, to decrease the vibration which is destructive to mechanical parts, and to relieve the discomfort of the passengers.

Road conditions vary from the roughest with chuck holes, ridges and bumps to the improved highways, which are the nearest perfect.

On the former only low speed is possible and the springs and tires are constantly in action; as we approach the latter high speeds are obtainable and the tires' function is to reduce the vibration to a minimum. So springs and tires necessarily work together as the following example shows.

Function of Springs.

The operation of a car equipped with pneumatic tires but with no springs on a bumpy unimproved road would result in great discomfort to the passengers. With such a car on an improved highway the passengers would hardly feel the small unequalities of the roadbed.

A car equipped with solid tires and well-designed springs would give good performance on the bumpy road, while on an improved highway at increased speeds the vibration would be great. The nearest approach to the ideal is a car with well designed springs and adequate sized pneumatic tires.

Types of Tires.

The two general and distinct types of tires on the market are solid and pneumatic. The solid tire has found its field in the motor truck, when the loads are heavy, the design substantial, and absolute dependability is necessary—all at a sacrifice of speed. Solid tires, since rubber is non-compressible, rely on this power to distort and regain original shape to absorb road shocks. The standard types of solid tires are built to obtain economy and endurance of the tire itself rather than cushioning qualities. The cushioning quality varies with the height of the tire and is gradually decreased as the tire wears down. It also depends upon the degree of softness of the compound used, but the amount of cushioning thus obtained is limited because below a certain point the life of a tire decreases rapidly with any increase in softness of the compound. With the same height of tire, added width results in an increase of the cushioning qualities.

The public has recognized the shortcomings of the standard solid tire and has had the "bugaboo" of flat pneumatic tires, so that cushion tires have come on the market with varying success. The essential features are a softer compound used in greater quantity, and designs with such unique features as air chambers, overhangs, and notches to allow greater distortion.

The pneumatic tire has already established itself on the passenger, motorcycle, bicycle and airplane. It has all but conquered on the light delivery vehicle, and the struggle for supremacy is about to start on heavy-duty trucks. The superiority is based not on lower cost per tire-mile, but on lower truck-mile operating cost; this is affected by increased speed, increased radius of operation, decreased fuel consumption, and by the decrease in upkeep and depreciation. The redesign of the truck, which is bound to come in order to reduce the weight of the carrier as compared with that of the load conveyed, will also be a factor in decreasing the operating cost.

Types of Pneumatics.

The pneumatic tire has three types, clincher, straight-side and quick-detachable clincher. Aside from the straight-side having a slight superiority because of increased air volume, the cushioning qualities are identical. Each type can be built in integral or two-cure construction without affecting the riding qualities.

Advantages of Cord Types.

The type of construction also aids in obtaining easy riding qualities. The standardized 17¼-ounce square-woven duck used for tire fabric is being replaced in the highest grade tires by a cord that varies in size from a two-ply cable to a multiple-ply cord built up in layers. The essential feature as regards cushioning qualities is that the tire with the cord construction resists bending to a much less degree and recovers itself more readily. At the same time less internal heat is generated and the power consumption is decreased. The fundamental principle is that a cord tire, because of its construction, can carry a given load with less air pressure and without fatigue or injury than can a fabric tire. A great gain in riding qualities results therefore from the use of cord tires.

Size and Inflation.

A far more important point to the easy riding and life of the tire is the tire size and inflation pressure. The proper tire to carry a given load is important to both car owner and manufacturer. As soon as the owner finds his tire service is poor because of overloading he puts more air in his tires to carry the load and thereby loses the qualities which give easy riding.

The inflation schedule, given in a paper delivered at the June, 1915, meeting of the Society, shows the amount of load and inflation under which a given size of tire works satisfactorily. For ideal performance the tire should be deflected from 10 to 12 per cent. of the sectional height. This gives the best combination of durability and riding qualities.

Riding and Service.

Let us take an example of good practice. If a 1,000-pound load is to be carried, a 4-inch tire at 80-pound pressure would give reasonable satisfaction, but would be hard and rebound at uneven places in the road. The owner, if not satisfied with

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the riding qualities, might decrease the pressure and gain easy riding at the sacrifice of durability. The life of the tire is thus impaired. The most satisfactory answer is to use a 35 by 4½-inch tire and

PNEUMATIC TIRE SERVICE.
Five Major Troubles vs. The Operating Conditions

1. Tread rubber wear	each considered against	A. The load carried.
2. Separation between plies; and separation of tread from carcass		B. The inflation pressure.
3. Fabric breaks; and blow-outs		C. The speed.
4. Bead troubles		D. The spring suspension.
5. Tube troubles		E. The power of the engine.
		F. The condition of the road surfaces.
		G. The nature of the country.
		H. The weather.
		I. The temperament of the driver.

to decrease the pressure to 67 pounds. This gives the proper 10 to 12 per cent. deflection, and the tire is good for long service. The riding qualities have been wonderfully increased, because the tire at the reduced air pressure is flexible and adjusts itself to the unevenness of the road, thus transmitting none of the vibrations.

Oversize and Overloading.

It is to the advantage of car manufacturers to equip as nearly as possible their cars with tires conforming to the sizes given in the table, or the car will enjoy the reputation of hard riding or that of a tire hog as the case may be. Overloading on original equipment has been practiced to a considerable extent, but manufacturers are more and more beginning to appreciate the evil results. It is unfair to the car owner if the manufacturer uses an oversize tire as original equipment and does not leave any alternative in case the owner wishes to use larger tires without changing the rim and wheel equipment.

The inflation schedule, given in a paper by P. W. Litchfield, dealt with easy riding of tires, life and durability. He has made the tire oversize to such an extent that the actual section is from ¼ to ⅜ inch greater than the nominal. He gains the effect of an oversize and thus allows the use of lower air pressures, the recommended decrease being 10 per cent. To this oversize feature a great deal of the easy riding and endurance of the cord tire can be attributed.

The tire's overall diameter affects the riding qualities only slightly, but it is noticeable that as the roads improve the diameter decreases. This is

INFLATION AND LOAD TABLE FOR PNEUMATIC TIRES.

Inflation Pressure	Section Diameter of Tires, Inches											
	3	3½	4	4½	5	5½	6	7	8	9	10	12
45	375											
50	415	520										
55	460	570										
60	*500*	620	750									
65		675	815	955								
70		*725*	875	1030								
75			940	1100	1280							
80			*1000*	1175	1365	1550						
85				*1250*	1450	1640	1860					
90					1535	1740	1970	2450				
95					*1620*	1835	2080	2585				
100						*1930*	2190	2720	3280			
110							*2410*	2990	3605	4250		
120								*3260*	3935	4630	5360	
130									*4860*	5020	5810	8070
140										*5400*	6260	8360
160											*6710*	8940
170												*9800*
180												.....

Maximum inflations are given in italics.

shown by the fact that English and French tires are made in small diameters owing to the better highways.

The following is an extract from an article by P. W. Litchfield on History's Lesson to the Motor Truck, which appeared in the "Scientific American," and states clearly the reason for mounting heavy loads on air.

Success Due to Pneumatics.

"With steel tires the bicycle made but slow progress; the adoption of the solid rubber tire gave it increased public usage, but the pneumatic tire made it a big industry. The use of the solid tire on carriages increased the comfort of riding, but the pneumatic tire allowed the carriage to go so fast with comfort and safety that the horse was outgrown and became too slow, the result being the substitution of the engine.

"The automobile was made possible by the pneumatic tire. The internal combustion engine is a delicate mechanism. It has to be geared to the wheels in some form, hence the necessity of a perfect road, or of absorbing the shocks before they reach the wheels. The pneumatic-tired automobile

ANALYSIS OF CAUSES OF PNEUMATIC TIRE TROUBLES.

1. Unsatisfactory tread wear.	caused by	Wheels out of alignment
		Poor road surface conditions
		Too much power
		Improper use of brakes
		Disintegration from oil
		Skidding
		Under inflation
		Cutting of tread rubber by sharp stones
2. Separation between the plies of fabric; and separation of the tread from the carcass.	caused by	Riding flat
		Riding under inflated
		Punishment on rough roads
		Riding on car tracks
		Water soaked
		Overloading
		Heating from speeding
		Started by cuts
3. Fabric breaks; and carcass blow-outs.	caused by	Overload
		Under-inflation
		Stone bruise
		Flexing of the carcass fabric (after long service)
4. Bead troubles.	caused by	Under-inflation
		Overloading
		Bent rims
		Injured in applying
		Riding flat
5. Tube troubles	caused by	Leaky valves
		Pinched tubes
		Punctures
		Riding flat
		Heating from speeding

replaced the horse-drawn carriage, because it saved time, went farther and faster. It increased the amount of travel and increased the distance traveled. Statistics show that now, after the few years of their existence, automobiles are covering as many passenger miles as the railroads; not that the railroads have suffered any great loss of business, but that the increase has been created and absorbed largely by the automobile.

Developing the Truck.

"Following the passenger car came the light delivery truck, this replacing the horse-drawn truck, largely on pneumatic tires. Then we find the motor truck used in larger and heavier fields, still making an attempt to replace only the horse, and equipped with solid rubber tires, which had been practically abandoned on every other form of motor vehicle almost immediately after their adoption. Evidently the tiremaker had not kept pace with the development of the truck or the truck builder was making a mistake. Up to now the former is probably the case.

Cushion and Traction.

"It has long been known to the tire maker that compressed air with a durable container is the most

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efficient cushion and traction shoe for the wheels of an automobile. Also, that the load and cushioning quality depend merely on the volume and pressure, and if great enough, there is little fatigue and wear to a properly designed tire casing. The manufacturer of practical commercial pneumatic tires jumped from the 1½-inch bicycle tire to the 4½-inch automobile tire in a year or two, and the latter has been the maximum size up to the present time. The resistance of close woven fabric to taking the form of a doughnut, its inability to stand the flexing and traction of greater loads, and the greater stretching and crimping given it in the larger sizes, seemed to establish the 4½-inch size as the limit.

Future Tire Sizes.

"The progress of tire design during the last two years has shown that this limit no longer stands if, instead of woven fabric, laminated cords without cross-weave are used. These cords take the strains without undue fatigue, and we now see our way clear to pass from 4½-inch cross section to 12-inch cross section as easily as we went from 1½-inch to 4½-inch. It is only a question of study to perfect the large pneumatics so that the truck can repeat the remarkable growth of the passenger car. Pneumatic tires up to 9-inch cross section are now in successful commercial use on trucks and passenger buses. The speed of and the distance traveled by these vehicles have been increased and the upkeep costs reduced. The tire cost per mile may be higher than with solid tires, but this same is also true of passenger cars. A solid tired touring car would have a tire mile cost of less than half of one with pneumatics, but all other costs—fuel, upkeep and depreciation—would be higher.

"The first trucks designed for solid tires were lighter than those in use today, but the vibration caused so much breaking of parts that they have been strengthened and reinforced repeatedly. This can all be saved by using pneumatics, permitting lighter chassis and bodies to carry heavier loads. Also the traction of large single pneumatics is much greater than that of solids, so that the trucks can be operated in sand, mud and snow, where the solid tired trucks would be stalled. The gasoline and oil consumption is much less when pneumatic tires are used.

Greater Speed Possible.

"The motor truck so far has only attempted to replace the horse in hauling merchandise because the solid tire has so limited its speed that it could not compete with any form of transportation requiring long hauls at higher speeds. When it can accomplish this, it so enlarges its speeds. When it can accomplish this, it so enlarges its field that it becomes a real competitor of the railroads."

*Paper read before the Pennsylvania section of the S. A. E.

Will Omit License Fees.

Wisconsin believes in encouraging the driving of automobiles and commercial cars over the road instead of contributing to the freight congestion now prevailing. Dealers, etc., driving cars from the factories and over the highways of the state will not be obliged to take out a license; that is, if the bill granting this privilege passes the legislature.

What's In a Name?

It is interesting to note the circumstances responsible for the adoption of many of the most popular and best known names of cars abroad. Putting aside the cars which bear the names of their makers, there must have been special reasons for the adoption of such titles as Sunbeam, Rover, Phoenix, Peerless, Moon, Simplex, Lorraine-Dietrich, Argyll, etc.

The combination of initials, which form a word, is very common with the Italian makers, for example, F. I. A. T., S. P. A., S. C. A. T., etc. When the F. I. A. T. company was formed it was decided to adopt a title which would fully explain the nature of the business and the location of the firm, and at the same time to get such a combination of initials as would form a readily-remembered word. The best combination appeared to be Fabbrica Italiana Automobili, the initials of which gave the word Fia. This was placed on the office wall, together with a number of others, with a view to soliciting suggestions from all comers.

Probably the word Fia would have been adopted, when some stranger entered the office and wrote after the title the word "Torino," followed by a big interrogation mark. This was a happy thought, for the factory was being established in the town of Turin, and the four initials gave the word "F. I. A. T."

Used Car Show.

The second annual used car show of the Chicago Automobile Trade Association will take place at Chicago, Ill., March 30 to April 7. It will be the second annual event and will be held in the Coliseum. At the 1917 show 369 passenger cars, total value $275,825, were sold. Truck units, commercial cars and accessories amounting to over $52,000 were also disposed of.

Issues Neat Brochure.

The Allen Motor Company, Fostoria, O., is issuing a very neat brochure illustrating and describing the Allen 41 car. The booklet is unusually well illustrated and printed and contains a longitudinal sectional view of the 41 chassis. The points emphasized of the construction are numbered, and these features are fully explained.

COMING EVENTS.

Cedar Rapids, Ia., March 11-16.—Show, Cedar Rapids Automobile Trade Association.
Warren, Pa., March 13-16—Show, Warren Automobile Dealers' Association.
Great Falls, Mont., March 16-20.—Second Annual Show, Montana Automobile Distributors' Association.
Vancouver, B. C., March 19-23.—Western Canada Automobile Show Association.
San Francisco, Cal., March 19-24.—Show, Motor Truck Dealers' of San Francisco.
Houlton, Me., March 20-22.—Second Annual Show, Houlton Motor Car Dealers' Association.
Holdredge, Neb., March 20-23.—Second Annual Show of Southwest Nebraska.
Trenton, N. J., March 20-23.—Show, Trenton Auto Trade Association.
Bridgeport, Conn., March 25-30.—Sixth Annual Show.
Atlantic City, N. J., March 30-April 6.—Second Annual Show.
Hartford, Conn., March 30-April 6.—Show, Hartford Automobile Dealers' Association.
York, Pa., April 3-6.—Show, York Auto Dealers' Association.
Red Bank, N. J., April 6-13.—Show, Monmouth County Automobile Dealers' Association.
Stockton, Cal., April 9-13.—Show, San Joaquin Auto Trades Association.
Calumet, Mich., April 17-20.—Show, Copper County Automobile Dealers' and Garage Owners' Association.
Chicago, Ill., September 23-28.—Accessories for Ford Car Show.

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When Dealer's Talk Is a Warranty

I was consulted recently in a way which had never fallen to my lot before. I regard it as a most unique experience. The sales manager of a wholesale concern who not only put selling talks in the mouths of his men, but also does considerable selling himself, came to me and laid before me a problem which was substantially this: "I am an exuberant salesman. It is my way to enthuse over my goods, and when I am enthused I am apt to say more about my goods than I intend to. Only last week a customer pinned the house down to something I had said, which he contended amounted to a guarantee and which I had no right to give at all. I had to admit that I had said about that thing, and the house allowed his claim. I have been told that a man is allowed to brag up his goods, to a certain extent, and isn't held strictly down to every word, now I want to know how far I can safely go in my selling talks. Is there any rule which I can use and have my men use, so that what I say will be only ordinary selling talk and can't be regarded as a guarantee?"

Dealer's Talk.

I gave him the best advice I could on the subject, and the incident is responsible for this article on "Dealer's talk: What it amounts to in the sale of goods."

The inevitable conclusion after reading and digesting the law on this subject—there are innumerable cases—is that there is no rule which a business man can lay down for himself, and apply with certainty, but there are certain useful principles which he can keep in mind, and these should check him from going too far in his representations about his merchandise. Of course this applies to representations made in every way they can be made—by word of mouth, through advertising, in letters and in every other fashion.

The importance of the thing is this: if the seller in what he says about a thing he is selling, stays within the realm of "dealer's talk," he is not liable even if some of his statements are not borne out. But if he passes beyond "dealer's talk," his statements are warranties, and he will be strictly held to every one.

The cases make very little effort to define "dealer's talk." I give a working definition of my own: "Dealer's talk is something less than a warranty, and consists of an expression of opinion or judgment about the article, on a point as to which the seller has no special knowledge, and on which the buyer can be expected to have just as good an opinion and to use his own judgment."

Not a Warranty.

For instance, take a dealer selling automobile tires. He is not an expert. He says of a tire he is selling: "That's as good as any tire on the market." The buyer takes the tire, which isn't satisfactory. The statement "that's as good as any tire," would be considered in my judgment mere dealer's talk.

Note my statement in the above illustration that the dealer was not a tire expert. It would make a decided difference if he were an expert, for many cases hold that a statement made by a non-expert, which would be considered no more than dealer's talk, would be considered a warranty when made by a dealer having expert knowledge of the article he was selling.

From a couple of leading cases I assemble the following statement of the law governing the subject:

Mere commendation, praise or brag by a dealer, is not a warranty. Each seller has the right to extol the quality of his wares, and much latitude has generally been allowed, the language being regarded more as an invitation to purchase than as a warranty.

It is to be conclusively presumed that the buyer knew or ought to have known enough not to rely upon dealer's talk or the praise of their goods ordinarily indulged in by sellers.

This last paragraph is rather a sad commentary upon the integrity of the average commercial transaction, but such is the well settled law.

Merely Dealer's Talk.

There have been a great many cases in which these principles have been applied. Of course in practically all of them the issue was between a buyer who sought to enforce against his seller a statement (subsequently found to be untrue) which he claimed was a warranty, the seller taking the position that it was not a warranty, but only dealer's talk.

I mention a few of these cases here:

A statement "these are the best goods made," is not a warranty, but merely dealer's talk.

"I think he is sound," spoken of a horse one is selling, is not a warranty if the seller is not an expert veterinarian.

"You'll find this line will readily sell," is not a warranty which the buyer can claim was violated when the line doesn't readily sell. It is only dealer's talk.

"This is a very good machine and will do your work," is not a warranty when no special work has been mentioned between buyer and seller, or the work the machine was to do was mentioned only in a general way.

When a Warranty.

But when a buyer orders a machine for a specific purpose and says so, and the seller tells him: "You may rely on having a first rate machine which will do the work in a satisfactory manner," that is a warranty, and if the machine doesn't do this particular work in a satisfactory manner, the buyer can sue.

Putting the expression "approved standard quality" on a label, or so representing the goods in other ways, is not a warranty.

The rule is different where a man is passing a check or a promissory note, and says "this is good." Value is the only quality negotiable paper has and if it hasn't that it hasn't anything. Therefore every such expression is considered a warranty. Opinions of value as to other merchandise are usually dealer's talk.

The cases all emphasize the great difficulty of drawing the line between dealer's talk and warranty, and each case has to stand on its own feet.

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A Magazine of condensed and compact information for busy readers.

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ADVERTISING RATES MADE KNOWN ON APPLICATION

NEW YORK, MARCH, 1918.

Missing Numbers—Our Readers are requested to remember that it always gives us pleasure to re-send numbers which have gone astray in the mails.

The Automobile Dealer and Repairer in Australia and New Zealand.

Mr. R. Hill, Matlock House, Devonport, Auckland, New Zealand, is our accredited representative in Australia and New Zealand for obtaining new subscriptions.

PROMPTNESS REQUESTED.

If the Post Office Department is making money on parcel post packages, which cost to carry an average of 3 cents a pound, why should it claim that the cost of carrying periodicals is 9 cents a pound?

Is not this a manifest absurdity?

The increase in second-class postage, brought about by a Congressman from a State that only publishes local newspapers, looks very much like pure persecution. If you have not already done so, we suggest that you write to the Representative of your district in Congress as soon as possible, and to the two Senators from your State, and ask them to vote for a repeal of this unjust second-class postage measure, which was enacted at the last session of Congress.

We hope every one of our readers who has not already done so will act upon this suggestion promptly.

FORD AS A PRESS AGENT.

Was Henry Ford's peace adventure, when he went to Europe to get the "boys out of the trenches by Christmas" a surpassingly brilliant press agent stunt?

Many things that have happened since could be brought forward to sustain such a view. For instance, after he came back from his supposed wild goose chase and war was declared on Germany, he offered his entire plant to the Government for the manufacture of war materials. He is now putting all his remarkable ability into the work of building submarine boat chasers. While committees and commissions and war boards at Washington discuss and wrangle and plan (though with meagre results) Ford is at work and it is announced that he expects to build a chaser a day when he gets into full swing.

No man in the manufacturing line has succeeded in getting himself advertised, without cost, on the front page of every daily paper in the United States so many times as has Henry Ford.

Barnum, that so-called prince of press agents, even at his best was a child in the matter of securing free advertising in comparison with Ford. From an apparent pacifist of the first rank he has developed into quite as pronounced a fighter and patriot as one could wish to see.

Long live Henry and his car! May his shadow never grow less!

OPPOSITION OF READERS TO INCREASE IN POSTAGE.

Our readers, many of them, have expressed themselves freely on the question of the obnoxious measure passed at the last session of Congress increasing the postage on all periodicals several hundred per cent. There is great opposition to this increase, as there ought to be. One of our subscribers says: "Where would the nation's business be today if it were not for the advertisements?"

Unfortunately, our legislators in Washington, a large number of them, do not appear to regard the advertisements as of any value to the business of the country. They are willing that we should send the reading portion of our publications at the rate of 1¼ cents per pound, or an increase of ¼ cent over the old rate, but after July 1, 1918, the rate will be 1½ cents per pound for reading matter. On the advertising portion of all periodicals, however, the country is to be divided into zones. For one year after July 1 the rate for the first and second zones will be 1¼ cents. This refers to subscriptions located within 300 miles of the place of publication. There are eight zones in the whole country and the rate increases progressively the first year up to 3¼ cents per pound. After that there is considerable increase for one year more, but after the third year the rate for the first and second zones is two cents a pound, increasing up to 10 cents for the eighth zone. The eighth zone will include all the Pacific Coast States, and many of the far Western States.

The lack of business intelligence on the part of Congress in connection with this postage business is shown by this zone system. It is well known, of course, or should be, that publishers cannot have a subscription rate for each zone, but are compelled to have what is called a flat rate, or the same price for all parts of the country, so that the only way they can save themselves from serious loss in all the zones, from the fourth to the eighth, is to largely increase the subscription rates.

Of course, 10 cents per pound for carrying second-class publications, which includes all weekly and monthly periodicals, is an outrageous rate. If this measure goes into effect July next, it will compel the big periodicals published in most of the large cities of the country to increase their rates from 50 to 100 per cent., or to concentrate their efforts for subscribers in the nearby zones, leaving out the

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far distant subscribers, or compelling them to pay a largely increased price, as we explained in our last issue.

A bill is before Congress now to repeal this unfair measure. If the subscribers of all the periodicals in the country who will be injuriously affected by this law will write letters of protest to their Congressmen and Senators and insist that this law should be repealed, it seems likely that pressure enough may be brought upon Congress to accomplish the desired result.

If you have not already written to your Representative, we would suggest that you do so at once, and also to the two Senators from your State. You can get the name of the Representative of your district from your postmaster, if you do not happen to know it, and he should be addressed House of Representatives, Washington, D. C. The postmaster, also, if you do not happen to remember or know the full names of the two Senators from your State, can supply them, and they can be addressed Senate Chamber, Washington, D. C.

RED TAPE.

The newsapers have had a great deal to say, ever since the war started, about "red tape," especially in the Navy and War Departments. Probably many people have an indistinct impression of what "red tape" means. To illustrate: suppose the Quartermaster-General, who is the head of one of the bureaus of the War Department, wants something that is badly needed, and wants it in a hurry. There ought to be some way for him to get it, but apparently there is not. He must first make a requisition for the particular thing wanted. This requisition goes to the Secretary of War for his approval or rejection. The Secretary of War sends it to the War College. If it is something out of the usual order, the War College appoints a committee to consider the matter. This committee usually takes its time, no matter what the rush may be, and finally hatches out an opinion, which it reports back to the War College for approval. This opinion may differ considerably from the original idea of the Quartermaster-General.

The War College returns the requisition, with its endorsement, one way or the other, on the back, to the Secretary of War, and the Secretary of War performs a similar function and sends the requisition back to the Quartermaster-General. If it happens to be approved all the way through, the Quartermaster-General can then act.

In the meantime, a week or two or even a month may have elapsed, when, as stated, he was in a hurry to get what he wanted. That is the usual process of what happens in the various departments of the Government. There seems to be no way for any department to get its wishes fulfilled speedily and directly.

Last summer, after war was declared with Germany, and time was of the utmost importance, a committee was appointed to select a machine gun. This committee spent three or four months experimenting, and finally fixed upon a gun—the Browning—which has never been tested in the field. No arms company or Government workshop was in a position to make these guns. The tools and machines necessary first had to be made, so that no guns have yet been delivered. General Crozier, head of the Ordnance Department, testified recently before the Military Committee of the Senate that none of these guns probably will be ready before next April, and that it will be July before we would have much of a supply—or considerably over a year since war was declared.

Naturally, the average man of common sense wonders why General Crozier's department had not done some experimenting for the purpose of selecting a machine gun long before war was declared. The dark cloud of the European contest hung over the country for two years, with every prospect that the storm would finally reach us, but the complacent heads of the various departments could see no reason for action looking to being ready for an emergency if one should arise.

The Government was also without rifles, and proceeded deliberately to experiment for a time on a new model, which could not be made in any quantity rapidly because there was no machinery built for the purpose. The result of this negligence and failure to prepare properly has been that thousands of our young men in the various military camps have been compelled to drill with wooden guns. It would appear that we are just as wofully lacking in the artillery department as in all the others, and that we have no big guns whatever such as are being used in the great European war, and with not much prospect of having any for some time to come. "Red tape" and inefficiency are of course responsible for the conditions referred to.

Recently, here in New York, the Merchants' Association sent a request—an urgent request—to the Secretary of War to provide guards for the new shipyards at Newark. Of course the request had to go on the usual crooked road, and was at last referred to the commanding general of the Eastern Department. He appointed a committee to consider the matter, and this committee did not consider it advisable to use soldiers for guarding industrial establishments of this sort. A month elapsed before the Merchants' Association even got a reply to its request. Meantime, the enemy agents got busy, as was to be expected, and set fire to the Newark works, resulting in damages of over a million dollars, though the entire plant was fortunately not destroyed.

It would seem as though every shipyard and industrial plant where Government work is going on should be guarded carefully by soldiers, not by civilian guards. Several explosions, accompanied by big fires, and causing damage to the extent of millions of dollars, have already occurred because of the lack of proper military protection.

We all want to see the war prosecuted vigorously and intelligently, but few of us can have any patience with such inefficiency as we have outlined.

Death of George Batten.

George Batten, president of the George Batten Co., Inc., advertising agency, died on Saturday, February 16. Mr. Batten was well known throughout the country as the head of one of the most important advertising agencies in America and a great deal of the success of this agency was unquestionably due to his personal ability. He will be greatly missed by a large circle of friends and acquaintances.

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Helpful Hints and Mechanical Suggestions

To temper small springs, etc., heat to a cherry red and cool in rain water, dip in hard oil, hold over a fire until the oil burns off; repeat the oil dip twice more and then cool off in oil. Knife blades of thin steel can be tempered without warping by laying them between two pieces of iron. Bolt together and heat to a cherry red, cool in rain water and draw temper by dipping the back of the blade in hot lead until you get a ark stone color on the edge, then quench.

Annealing Small Pieces.

To anneal small pieces of steel or tools heat up slowly to a red, and then take two pine boards and lay the hot steel between them, and screw them in a vise. As the steel is hot it sinks into the wood and is enclosed in an almost air-tight charcoal bed. When the work is removed after cooling it will be found to be very soft. The boards prevent the steel from becoming cooled off too quickly. The operation can be repeated when necessary.

Thread Marking on Bolts.

Sometimes bolts have to be shortened and the thread does not permit of the proper adjustment of the member or the nut. Where a die is not available the bolt can be marked for threading and new threads cut by the following method: A piece of board is cut so that the notch will fit the nut, and a hole made at the other end by driving in a nail and drawing it out. A pencil is next inserted in the hole and rubbed with chalk. By turning the nut and attached wood device the pencil marks the bolt so that the threads may be cut with a three-cornered file.

Driling Holes in Lead.

Drilling holes in lead is not so easy as it would appear, as the metal is soft and a ragged burr generally is the result of the work. Use a good grade of lard oil and plenty of it. Lift the drill two or three times and clean out the chip. With power a speed of 800 revolutions a minute should be employed.

Speeds of Cutting Tools.

To secure the best results from steel used for cutting purposes, attention must be given to the use of calculations in determining the proper speed of the work or tool, according to the conditions. The average machinist in ordinary practise does not make use of these rules, but depends on the knowledge acquired through experience and observation. For the benefit of those who are not familiar with rules for finding cutting speeds, and to obviate the necessity of guessing at the proper speed, the approximate cutting speed at which tools or work should be run in the machining of different metals is herewith given:

Cast iron, 14 to 16 circumferential feet a minute.
Malleable iron, 16 to 20 feet a minute.
Steel, 12 to 15 feet a minute.
Brass, 28 to 40 feet a minute.

The circumstances and conditions upon which slight variations of the speeds given depend are numerous, among which are: Whether a rough or finishing, coarse or fine cut, is being taken; the form and shape of the cutting tools; the toughness and density of the metals being worked upon, and the surface machined without regrinding. There is considerable work done in the lathe or planer which requires cutters that project far out of their holders. For such work the cutting rates must be considerably less than above given. Very often the texture of the metal is tough and hard, necessitating slower working and fine feeds in machining.

Drilling Hard Iron.

Hard castings or hard iron can be drilled more easily if turpentine is used on the drill. Turpentine on a file makes filing these metals more easy.

Welding Low Steel.

To weld low steel or iron to malleable castings, use one part sal ammoniac and 10 parts borax. Melt together, then grind fine.

Restoring Burnt Steel.

Steel that is burnt can be restored to a certain extent by heating to a red, cooling in water and repeating the treatment several times; that is, if the steel is not burnt too badly.

Temperatures for Hardening.

The following gives the required temperature in Fahrenheit degrees to produce certain colors when tempering hardened steel: Lathe, shaper and planer tools, 430, very light straw; 450, light straw. Taps, dies and turning tools, 470, dark straw; 490, very dark straw. Hatchets, chisels, etc., 500, brownish yellow; 520, yellow, tinged with purple; 530, light purple. Springs, 550, dark purple; 570, dark blue.

Removing Dents from Brass, Etc.

Dents in lamps, etc., can be removed by utilizing a burnisher. Place a solid substance on the underside of the object and with a little pressure of the tool on the opposite side, the indentations can be smoothed out. The burnisher should be made of tool steel and highly polished after being hardened. Tools for any desired shape can be made for the work in hand.

Cutting Square Threads.

Square threads can be cut on the lathe by the following kink: With an ordinary V-shaped cutter, form a thread of the proper lead that will be equal in depth and width to the cut of the finished square. Then follow down with the regular square tool. This saves the latter which cuts a divided or broken chip. A roughing member should be used before cutting. If more than one piece is to be threaded, rough first then finish, as this will keep the tool snarp and result in a nice finish. The rougher should be speeded up and allowed to dig out the metal without regard to the finish.

Drilling Glass.

The average repair man seldom is obliged to drill a hole in glass, but when this is necessary in windshields, or headlights, he may not know just how to do the work. Obtain an old, three-cornered file, and grind it so that it has six corners and comes to a point. With this tool, and liberal applications of crude oil, the drilling operation is greatly simplified. Turpentine is sometimes used in place of the oil, but is not as good.

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TROUBLE-DEPARTMENT



This department is intended as a "trouble clearing house" for car owners, dealers and repairmen. Inquiries in relation to marine motors will likewise be answered as they are of interest to car owners and others who use the two-stroke cycle engine.

Readers are requested to make criticism and comments or to freely discuss any subject of interest to the automobile industry, and to add information of their own experience in remedying troubles.

Inquirers are asked to give the fullest information in every case so that replies may be made intelligently, and thus be of interest not only to the inquirer but to others.

2376 Valve Clearance in Overland.

From T. M. Perkins, Texas.—Will you please tell me the proper valve clearance in an Overland Model 42? What is the cause of smoke rising from the breather pipe? Can you tell me where the part of the automobile called the skid is located and what is its purpose?

Reply. — When cold the clearance between the valve stem and tappet should be approximately .003 of an inch, a setting which should be checked after the engine has heated. After the engine has run for a number of minutes and is well heated, stop it and with the hand crank turn it over until the first tappet has opened the valve and closed it, continue to turn for one-quarter of a revolution, then see that the tappet is free and does not bind on the valve stem. Should it bind, the adjustment should be made to between .0015 and .002. Each valve and tappet should be adjusted in the same way.

The smoke from the breather pipe may be due either to overheated oil in the engine base or compression leakage past the pistons. We do not know of any automobile part called the skid. Possibly you refer to a skid as used for storing an automobile in a freight car, which is simply a method of blocking the automobile to prevent it from rolling in the car.

2377 Hupmobile Timing.

From J. J. Martell, Michigan.—Will you kindly tell me how to time the magneto on my Hupmobile roadster? The magneto is marked Bosch DU4 and has a set spark. Will you also tell me how to adjust the carburetor, which is a Breeze? Would a Ford carburetor work all right on this car?

Reply.—The Bosch model DU4 magneto should be timed to make a spark at top center of the piston in the firing cylinder. Turn the engine over until the piston in number one cylinder is at the extreme top of its stroke, when both exhaust and intake valves will be closed. Remove the magneto breaker box cover as well as the distributor cover and turn the magneto shaft until the distributor brush is directly below the terminal leading to number one cylinder. At or near this point the points in the breaker box will start to separate and the gears will mesh. To check the timing, turn the engine over until number two piston is at the top of its firing stroke when the breaker point will snap apart, and the distributor segment will be below the terminal leading to number two cylinder.

For adjusting the Breeze carburetor, first open the needle valve for about one turn and start the engine. Open the throttle slightly and turn the valve back until the engine begins to slow down or backfire, then forward until the engine shows highest speed. Open the throttle three or four notches, suddenly, and note the engine action. If it acts sluggish, loosen the auxiliary air intake adjusting nut and turn the adjustment toward the right or clockwise, letting in more air. If it fires back, turn the adjustment toward the right. Open the throttle to about half way on the quadrant and find the air adjustment which gives the best results. After adjusting, be sure to tighten the lock nut. The regular Ford carburetor should give good results on this engine if the manifold connections are the same and the manifold opening on your machine is no larger than the opening into the carburetor.

2378 Removing Motor Starter.

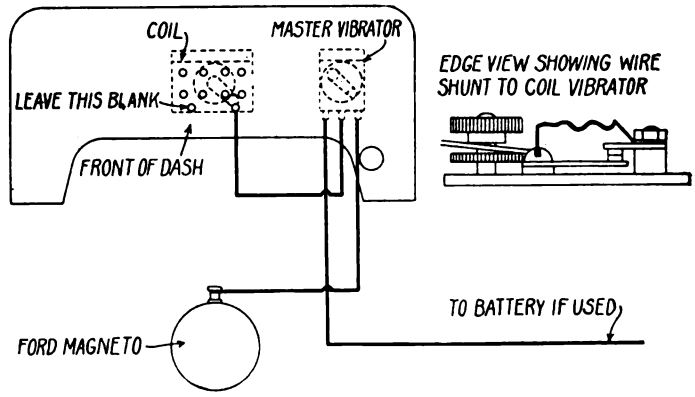
From J. McGiveron, New York.—Kindly give me a wiring diagram for a 1915 Maxwell with the starter removed; that is, I want to disconnect the starter from the car and do away with it, to start the engine with the crank.

Reply.—The only precaution necessary to take in removing the starter from the engine is to properly insulate the wires when displacing them from the starter in order to avoid any danger of the battery discharging through contact of the wires with metal of the car, etc.

2379 Wiring Master Vibrator.

From New Reader, Iowa.—I purchased a second-hand Ford and am told that using a master vibrator will make the engine run better as the coil is an old one. Is this true? How should vibrator be wired?

Reply.—A master vibrator will improve the operation of an engine relying upon multiple induction or vibrating coils. This is due to the fact that synchronization is possible with the master vibrator, whereas with multiple unit coils, particularly when worn, it is difficult, if not impossible, to obtain synchronization. The accompanying illustration shows



Illustrating How Master Vibrator Is Wired on Ford.

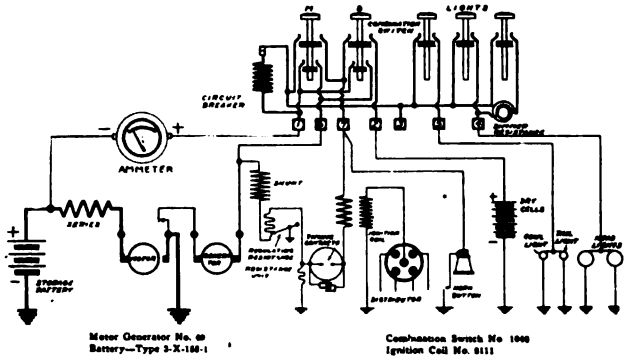
method of wiring. The shunt shown can be accomplished by using a wire or screwing down the adjusting screw to make a fixed contact between it and the vibrator blade of the coil.

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2380 **Attaching Ammeter.**

From N. D. Collins, Vermont.—Will you please publish a wiring plan showing how to attach or install an ammeter in a model 37 Oakland car, a 1915 design?

Reply.—An accompanying sketch shows the place to insert the ammeter in the circuit, in the charg-



Circuit Diagram of Model 37 Oakland Showing Location of Ammeter.

ing circuit. The connections should be made by removing the wire from the No. 1 terminal on the back of the switch, and connecting this wire to the negative terminal on the meter, and from the positive terminal on the meter, connect a similar wire to the No. 1 terminal on the switch. A meter thus connected will show both the charge and discharge rate of the storage battery.

2381 **Kerosene As a Fuel.**

From L. Minch, Indiana.—Do you think that kerosene can be burned successfully in a four-cylinder, four-cycle motor? Do you think that this fuel can be used equally well in opposed engines and upright?

Reply.—The burning of kerosene oil in any internal combustion engine has not as yet been established to its full efficiency and is a problem that is bothering the engineers of today. The main trouble experienced is in properly vaporizing the fuel. Unless considerable heat is used, the fuel has a tendency to condense in both the manifold and cylinders, and thus "load up" the engine. In a vertical block engine, the condensed fuel would eventually find its way past the piston rings and into the crankcase, and its path of travel being distributed around the piston, it would cause little or no bother from cutting the lubricant. In the horizontal type, however, condensation would occur, and the fuel would drop to one side of the cylinder, and the cylinder oil might be diluted on this side and cause trouble. If an engine of the horizontal type were fitted with an efficient vaporizing device, the trouble might not occur. If you have any particular make of engine in mind, of either type, for kerosene oil burning, we would suggest that you investigate the record of performance of this engine. If the manufacturers are well known and established, they will be glad to give all information required.

2382 **Intake Speeder Device.**

From J. Paterson, Nebraska.—I should like to find out if the following device would damage my engine. To the intake manifold I should like to attach a petcock and take hot air from the exhaust manifold by means of a copper tube. The petcock would be regulated by a rod from the instrument board. I find that I can increase the mileage five miles to a gallon of gasoline. I am told that a certain amount of grease on the Ford timer will cause the timer to give better results and give a hotter spark. Is this correct? Is not Dixon's graphite lubricant the best to use?

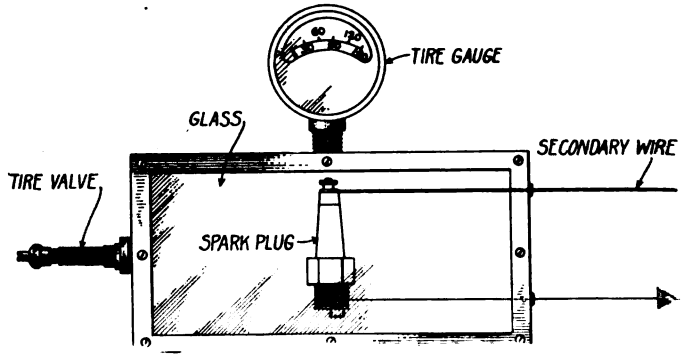
Reply.—Your idea of attaching a petcock to the intake manifold, in order to admit extra air at high engine speeds, is good and there are a number of such devices now on the market, which accomplish the same end. The hot air connecting tube should be wound around the exhaust manifold and not tapped into it, or there will be danger from fire. You might try the hot air tube device, as you suggest, but you should also try the engine without the hot air connection, for it is hard to tell just how the increased expansion of the mixture, due to the hot air at this point, will effect the volume of gas entering the cylinders.

The Ford timer will give better results if it is properly lubricated. A very small amount of vaseline or three-in-one oil answers the purpose nicely. Dixon's graphite compounds cannot be used in electrical systems of any sort, as it is a good conductor of electricity. For this reason it should not be used in the Ford timer or in the crankcase. You might write the Joseph Dixon Crucible Co., Jersey City, N. J., asking for their booklet relative to uses of their products.

2383 **Testing Spark Compression.**

From E. J. Sanger, Colorado.—Will you kindly tell me if there is any way to test a spark plug under pressure? I would very much like to have something on this order. I think it would be best if it was made out of glass so I could see the plug under test. It would have to be strong, as I would like to make the test with about 100 pounds air pressure. Kindly let me know if there is anything like this on the market.

Reply.—In so far as we know there is no device marketed as described. A tester can be made, however. An accompanying illustration shows the principles involved. It consists of a metal box or frame and the frame can be tapped and drilled so that the plugs can be screwed into it. A tire gauge is inserted as is a pressure gauge. The top or side, for that matter, can be made of heavy plate glass and screwed to the container. A rubber gasket should



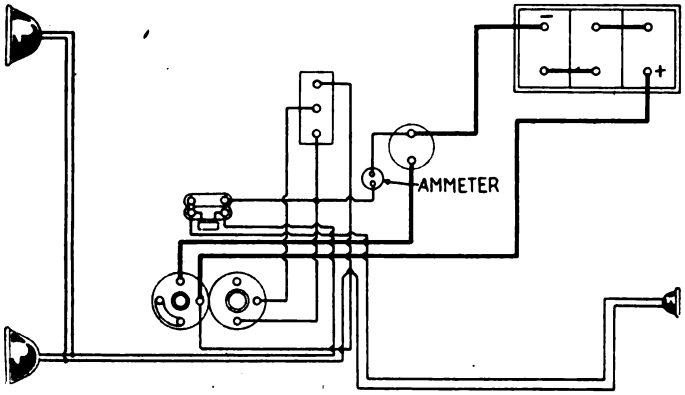
Illustrating Method of Testing Spark Under Pressure.

make the glass member tight and prevent leakage. The pressure or air is introduced through the tire gauge and to the desired pressure. If the tester is used on the bench the shell of the plug will have to be grounded. This is indicated in the sketch.

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2384 **Ammeter and K-R-I-T Car.**

From William Glasser, Pennsylvania.—My father has a five-passenger, year 1914, and bought an American Ever Ready ammeter. He has been to several garages to get it connected, but without results, so will you please give me instructions how to



Wiring Diagram Showing How to Insert Ammeter in Disco Lighting and Starting Circuit of K-R-I-T Car.

connect it? It is a two-wire system on the car and has no dash switch. I am a machinist and understand drawings.

Reply.—The accompanying wiring diagram shows how to insert an ammeter in the starting and lighting system of the K-R-I-T car.

2385 **Bosch Magneto Trouble.**

From F. G. Hoskins, Texas.—I have a White car, equipped with a Bosch DU4 magneto. By retarding the spark for cranking I get a good spark and have no trouble starting the engine. As soon as the spark is advanced, however, the current seems to weaken and I am forced to run on a retarded spark at all times. Can you tell me the reason for this?

Reply.—There are two reasons for your trouble: first, that the magnets may be weak; second, that the breaker points do not separate at the time when the low tension winding is cutting the greatest number of lines of force. The latter is probably the cause.

At some time or other you may have removed the timing gears or even the one carrying the distributor and slipped them around a cog or so. Unless you are an expert in this line we doubt if you will be able to make the repair and would suggest that you take the magneto to some electrician, who will probably be able to locate your trouble in but a few minutes.

2386 **Troublesome Knock.**

From W. J. Eastbaum, New Jersey.—I have been having some trouble with my 1912 six-cylinder Mitchell car of late. There seems to be a knock which I cannot locate. At car speeds of between 15 and 20 miles per hour the knock is not heard, but at higher speeds it begins to sound. The engine has been completely overhauled, all the bearings fitted, new cam shaft bushings, valve guides, push rod guides, wristpins and wristpin bushings and new rings, but the knock still remains. I have done everything I know to remedy it. When number three spark plug is short circuited the knock is deadened. Can you offer any suggestions?

Reply.—The fact that by stopping the explosions in number three cylinder has a tendency to lessen the knock is indication that the whole trouble is in the piston connecting rod assembly. The writer has had a similar experience with an engine and finally found the trouble was caused by the babbitt working loose in the bronze liner. If your car is fitted with this type of connecting rod bushing you might inspect it at this point. Be sure that the wrist pin is firmly clamped in the piston. It may be that though the wristpin fits the bushing in the connecting rod, the fit in the piston is poor. Such a condition would cause a knock.

2387 **Castor Oil as a Lubricant.**

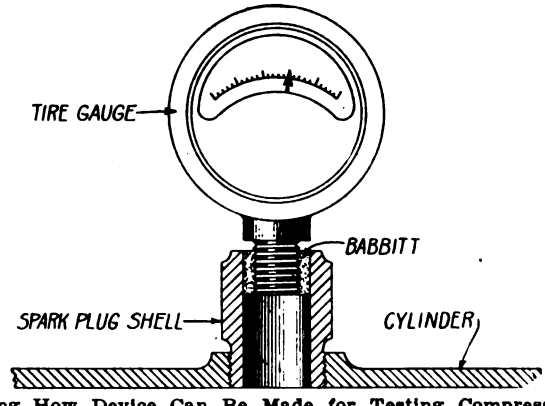
From A. H. Taylor, Maine.—Can you tell me if castor oil is any better for an automobile engine than an oil with a mineral base? If castor oil is the best, I should like to use it, but I don't want to take chances and perhaps spoil my engine.

Reply.—Editorial policy does not permit us to recommend either castor or mineral base oils, but we will give you the manufacturers' arguments, both for and against. As a lubricant, castor oil ranks, perhaps, the highest. Like any vegetable oil, however, in time it may give an acid reaction. Castor oil is used by many racing drivers and in many airplane engines where the matter of lubrication is of first importance. Properly treated and carefully tested from time to time, this lubricant should give satisfaction with but little attendant danger. Mineral oils usually stay in the same condition as when manufactured, and seldom show acid reaction. We would advise you to interview agents representing both types of oils before making a decision.

2388 **Pressure Gauge.**

From W. H. S., Rhode Island.—Will you please publish a picture and give a description of how to make a gauge for testing poor cylinders? You very often mention testing the compression in replies to readers.

Reply.—While gauges can be purchased one can be made without any great expense and with little labor. Procure a pressure gauge, such as is used on tire pumps for example. Next take an old spark



Showing How Device Can Be Made for Testing Compression of Cylinder.

plug shell, the threads of which are in good shape, and insert the gauge in it, using babbitt or lead to seal the opening. In other words, see that there be no leakage. A special reducing nipple can be used in place of the lead or babbitt.

To use the tester the spark plug shell is screwed into the cylinder as you would a spark plug. Crank-

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ing the engine until the piston of the cylinder completes the compression stroke will result in the air pressure registering on the gauge and in pounds. The device will be useful for testing for leaks. In using make sure there be no leaks around the threads of the tester.

2389 **Taping Magneto Coils.**

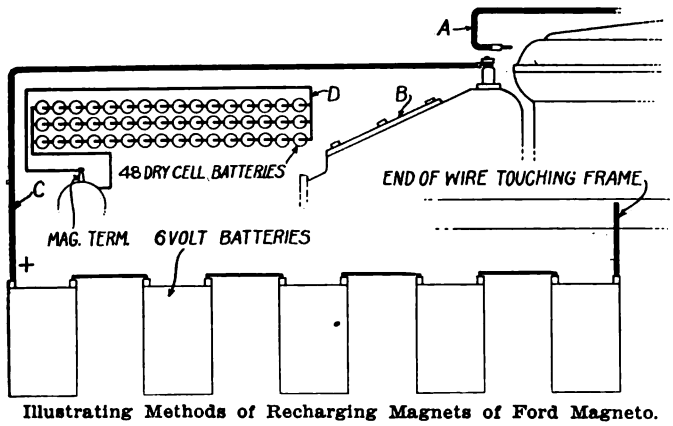
From M. L. Madsen, North Dakota.—I have a 1916 model T Ford. Some of the tape is off the coils leaving the copper bare. Can I not take these coils out and rewind them with new tape, then shellac them? What kind of tape should I use? I could shellac them now as is, but am afraid they would short circuit.

Reply.—The work can be performed as stated. In taping the parts employ an electrician's tape, one that is made especially for this work. Ordinary friction tape will not serve the purpose.

2390 **Magnetizing Magnets.**

From W. H. Rowland, Virginia.—Can a Ford magneto be remagnetized with dry batteries? If so, how?

Reply.—Dry cells can be utilized for the work but it will require 48, as shown in the accompanying drawing at D. The cells are used in multiple series. This is rather an expensive way to do the work, owing to the large number of batteries required. Another method is to employ five or six six-volt storage batteries and arrange them as shown. Disconnect the wire A which leads from the magneto terminal to that of the coil. Next displace the cover B of the transmission. Locate the brass studs on the rim of the flywheel which holds the magnets in place, and have some one crank the engine slowly until one of these brass studs is in line with an imaginary line drawn about one inch or so to the left of the magneto terminal and paralleling the frame. Another way is to place an ordinary small compass on the cover to the left of the terminal, at the same time turning the engine until the needle of the compass is parallel with the engine. The north pole of the needle should point toward the engine when in this position. Connect a wire from the positive + terminal of the battery to the mag-

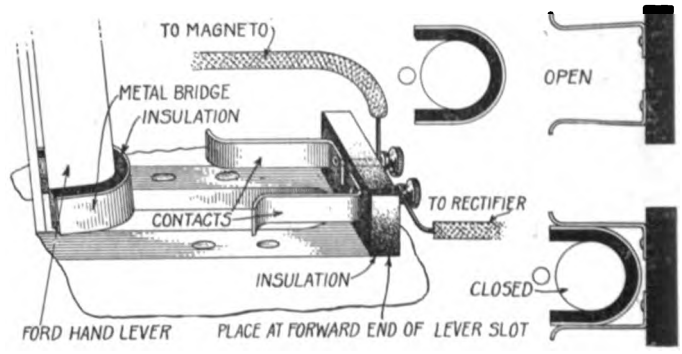


Illustrating Methods of Recharging Magnets of Ford Magneto.

neto terminal, as shown at C. Next connect a wire from the negative — terminal on battery, and make and break the circuit by touching the free end of the wire on some metal part of the engine. Do not make permanent connections. Make 30 or so very brief contacts.

2391 **Chemical Rectifier.**

From L. E. Seely, New York.—I read with much interest the article that appeared in the January issue, page 39, dealing with a chemical rectifier. I wish to ask a few questions as to its arrangement. 1—Will a rectifier of this type deliver enough



Illustrating Simple Switch Controlled by Lever for Preventing Current Passing Through Magneto When Engine Is Inoperative.

current to the battery to keep it charged if current is taken from the battery for ignition and lighting? I do not run nights. One Prest-O-Light gas tank will last me from one to two years. 2—Would a condenser increase the efficiency if placed in the system and at what point? 3—Would a battery stand up well under this kind of a current as under the current of a direct current generator? 4—All of the above questions refer to use of the rectifier with the Ford magneto. 5—Of what dimensions should the plates be, and can you suggest where they can be obtained?

Reply by Geo. A. Luers.—1—There is no advantage in using current from the battery for ignition, horn or headlights. Would suggest using magneto for this purpose and using the battery for lighting when the engine is not running. 2—Do not know the type of condenser you propose using. Do not believe in using anything that would tend to set up resistance. It is best to use the shortest wires possible in the battery wiring so as to keep resistance at the minimum. 3—A generator designed purposely for use in connection with a storage battery will give better results. The late model Fords have a magneto that delivers more current than the earlier types and it is to store the excess current from these that the rectifier will be of value. Charging will be in proportion to the speed of the engine and length of time it operates. In other words, you cannot expect to charge a battery when the generator or magneto is inoperative. The early type Ford magnetos generated only current enough for ignition. 5—The plates should be about 3x5 inches, although the size is not of as much importance as are the wiring and materials. Plates can be obtained from some local foundry. It is suggested that the correctness of the wiring and efficiency of the rectifier be tested by means of an ammeter before connecting it with the magneto. The current should not pass from the battery through the rectifier and if it does the ammeter will indicate this when the magneto lead is placed on one contact of the ammeter and the instrument grounded on the car frame. You may know that current passing through the Ford magneto will do it no good, that it will possibly affect the polarity of the magneto.

Unless the rectifier be cleaned occasionally, electrolytic deposits may gather and create a path for

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the current, creating leakage. To overcome the possibility of this or the chance of any short circuit around the rectifier, one can install a switch and so arrange it that it will be actuated by the speed lever of the car.

The advantage derived from this arrangement is that when the engine is stopped the clutch lever is pulled back, avoiding the possibility of any current passing through the magneto when it is not operating.

Test your battery regularly and have it charged if needed on cars having generators of no greater capacity than the Ford. If you do not use your car a great deal, then it may be well to construct a second rectifier of the same type, but larger to charge from the house lighting circuit. The switch referred to is shown in an accompanying illustration and requires no further explanation.

2392 Bosch Magneto Installation.

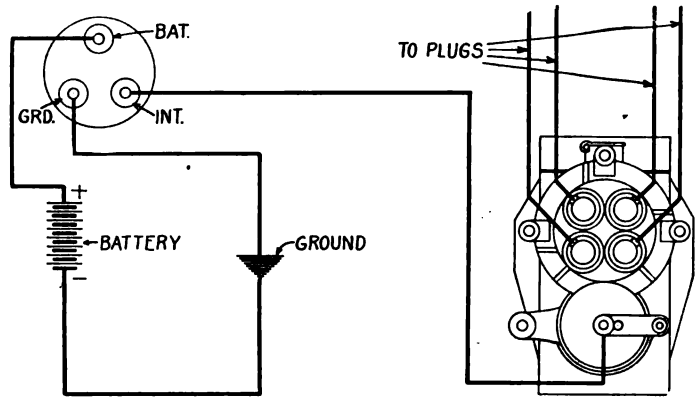
From Ed. Feala, Wisconsin.—Will you please tell me how I can install a Bosch magneto on a Ford engine?

Reply.—The Bosch Magneto Co., 223 West 46th Street, New York City, manufacture a special magneto equipment for the Ford car, which consists of a casting to be bolted on the front of the crank case and a gear for attachment to the cam shaft in place of the present timer. The magneto itself is bolted on to the casting.

2393 Using the Dixie Magneto.

From M. E. T., New Jersey.—In your answer to No. 2326 you advised him not to attempt to connect a battery to the magneto. This answer is correct for all magnetos of the true high-tension type except the Dixie. With the Dixie one can so wire the battery to the magneto that the magneto will operate when the starter is used. An accompanying illustration shows how to wire a battery to the Dixie magneto. The current passing through the primary winding of the magneto when the starter is operated is not enough to demagnetize the magnets. This is due to the unique construction of the Dixie instrument.

The Dixie auxiliary vibrator system permits the use of a battery in conjunction with a Dixie magneto, to assist in starting gasoline engines in cold weather or when cranked by hand. The auxiliary vibrator system consists of a vibrator, two small windings and a condenser, all housed within the switching device. The battery current is carried through the vibrator to the circuit breaker of the magneto; the high tension current being distributed



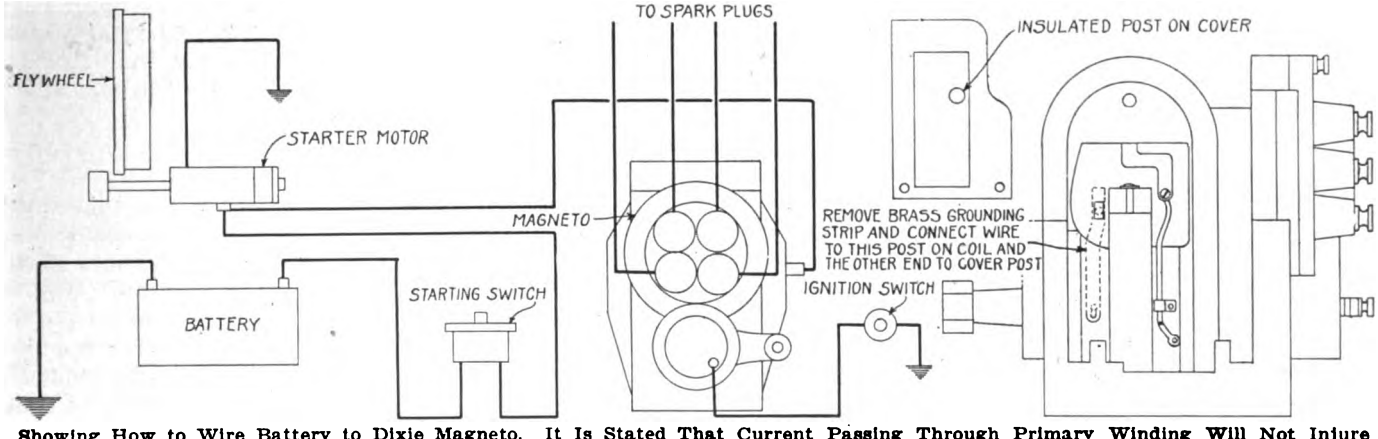
Illustrating the Wiring Plan of the Dixie Auxiliary Vibrator System, Permitting Use of Battery With Dixie Magneto and For Starting in Cold Weather.

to the spark plugs through the distributor on the magneto.

On the face of the switch are three letters, B. O. and M., meaning battery, off and magneto. When the switch lever is placed on either B. or M., the engine then operates on the source of ignition to which these letters refer. It must be understood, however, that the battery is intended only for starting. It should also be borne in mind that the battery will become exhausted if the switch lever is left on the battery position when the engine is not running.

The wiring of the Dixie auxiliary vibrator system is very simple, as will be seen from the wiring diagram. This shows the post marked bat connected to the battery. The other side of the battery is grounded. The post marked int is connected to the grounding terminal on the magneto and the post marked gr'd is connected to some part of the engine or frame as a common ground.

When the switch lever is placed on the battery position, the current from the battery is conducted through the vibrator windings to the vibrator and to the primary circuit of the magneto. The vibrator is simultaneously set into operation with the throwing of the switch lever on battery, but no sparks are produced at the plugs until the cam opens the platinum points, thereby bringing the magneto primary winding into the circuit. A continuous shower of



Showing How to Wire Battery to Dixie Magneto. It Is Stated That Current Passing Through Primary Winding Will Not Injure or Demagnetize Magnets.

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connecting one switch terminal to spark plug and the other switch terminal to one headlight igniter, carrying same wire over to second headlight igniter. When engine is running you either get a spark at spark plug or at headlight igniter. Of course, the engine is only running on three cylinders whilst you are lighting the acetylene gas.

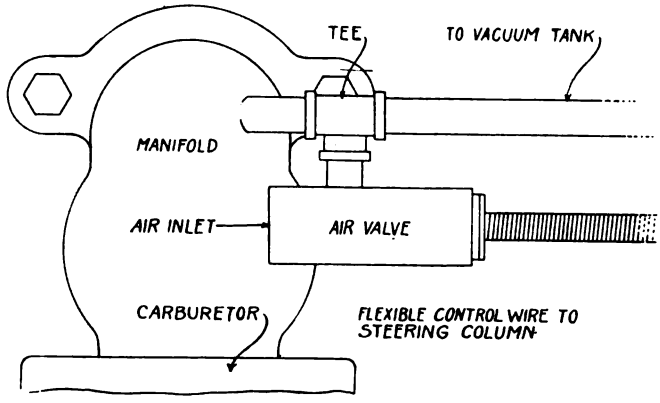
I was able to light my headlights whilst the car was running by carrying a control rod up the side of car at left-hand side. This enabled me to turn on the gas. To avoid explosion in headlights, it is just as well to turn on the spark before opening up the gas.

Using Air Valve.

From E. C. M. Cell, New Jersey.—In your reply to No. 2334, Frank S. Pickering, I note you do not recommend installing tube entering manifold near the fuel feed. I have installed just such a device and it has never given me any bother with my vacuum tank.

I have a Dodge car which has a Stewart carburetor and a Stewart vacuum tank. The vacuum pipe enters the manifold and just above where it enters I installed a "tee." This gives a straight through line to the tank, also an opening on which to fit a gas saver or air valve.

The one I put on consists of a small cylinder with a piston valve controlled by a flexible wire with leads



Showing Mr. Clarke's Method of Installing Air Valve in Intake Manifold.

up to a lever control attached to steering column.

This has the advantage of being practically noiseless compared with any air valve which has its inlet on the driver's side of the dash.

I found, however, that my mixture was so nearly right that admitting any extra air did not increase engine power except if the car was stopped and the engine idling for a few minutes. Opening the air valve slightly made the engine speed up.

I use the air valve for cooling off the engine quickly by shutting off ignition and opening valve wide whilst coasting down hill leaving clutch in, of course, and gear in high. Also use it to introduce kerosene into engine by means of a piece of rubber pipe attached to air valve giving the engine a "dose" whilst it is hot. This helps carbon and loosens up the piston rings.

Turning Hard Rubber.

From Arthur Boettcher, Colorado.—As lathe work is necessary to mechanics, this may interest some one who tries to turn prepared rubber. I had to face off some hard rubber discs and tried different steel, but couldn't cut it perfectly. At last I broke off a piece of emery wheel in V shape and fastened it in tool post. The result was a perfect job.

A Clutch Trouble Remedied.

From F. J. Smith, Kansas.—In looking over back numbers of your magazine, I noted an inquiry from B. H. H., Pennsylvania. If he has not found a remedy the following may be of service to him.

Hold clutch open and wash by squirting gasoline while the engine is running. When thoroughly washed lubricate with neatsfoot oil. Keep clutch spring tight enough and so that clutch will not slip.

Buy United States War-Savings Stamps.

Most of our readers no doubt are familiar with the War-Savings Stamps issued by the Government in denominations of $5.00 each. You pay the Government, say $4.14 for March and on January 1, 1923, the Government will pay you $5.00. The difference between what you pay and $5.00 being your interest. As the months progress the amount you pay the Government is a few cents more each month, as the interest accumulates.

You can obtain cards at almost any post office in the United States and if you do not wish to pay the entire amount, you can pay 25 cents a week, until the full amount has been paid. These stamp cards will cost you nothing. This form of helping the Government has proved to be very popular. It encourages thrift and the habit of saving.

Ford Prices Increased.

Unlike nearly everything else, the price of the Ford car has not been increasing steadily, and it was something of a shock to the people not long ago to find that the car cost had been increased. Late last month $90 was added to the cost of the touring car and runabout, while the chassis was increased by $75, bringing the price of the touring car to $450, the runabout to $435, and the chassis to $400. In addition to this, there will, of course, be an advance in the war tax which is figured upon the purchase price.

At the present time the daily output of cars at the Ford factory averages 1,600, or only about 40 per cent. of the normal output before war conditions arose that necessitated changes in the plant.

Industry Uses Little Coal.

Although the automobile industry ranks near the top in magnitude among all the manufacturing industries of the nation, it is a very light user of coal. According to report of the U. S. Bureau of Census for the year 1914, it ranked in forty-second place in tonnage of coal consumed. Less than half a million tons were used in automobile and motor truck plants in that year, while 31 other industries used more than 1,000,000 tons each, six used more than 2,000,000 and seven consumed more than 5,000,000 tons each. Steel works and rolling mills used more than 20,000,000 tons during that year, clay products companies more than 8,500,000, cement plants nearly 6,750,000 and paper and wood pulp mills more than 6,250,000 tons.

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This department is maintained for the protection of our readers—especially our reckless readers, if we have any.
The object is to encourage every operator of a motor vehicle to be careful and avoid accidents, especially the inexcusable accident of a collision at a railway crossing.

Despite the safety first campaign which is sweeping the country, automobile accidents continue to occur in ever growing numbers. It would seem that drivers should realize the importance of exercising care at railroad crossings, for if they did, many of the more serious accidents would never occur. Even if the driver does not think particularly of his own safety, he should feel greatly responsible for those passengers in his charge. Second in number to railroad accidents are those caused by skidding. Many of the latter take place on steep grades, where a little care and the slowing of the car speed would be sufficient to keep within the factor of safety. On cold, damp, or rainy days the driver of a car fitted with side curtains should be particularly careful. One should note the last example quoted, and receive a lesson thereby. When not entirely familiar with the road proceed with caution. A minute saved sometimes results in a life lost.

Car Backed Down Hill.—Misjudgment of engine power by the driver recently resulted in death to one occupant of a machine near Charmian, Pa. The chauffeur tried to drive the car up a steep grade and stalled the engine. The car began to drift down the hill backward, and the driver lost control. After a short distance the car ran to the side of the road and overturned. The chauffeur and one other passenger escaped.

Inattention to Business.—Because the driver chose the wrong moment to look over the side of the car, to be sure that all the baggage on the running board was safe, two persons were painfully injured near Ridgeville, W. Va., and the car badly damaged. The point where the accident occurred was at a curve, which the machine did not negotiate, going off at a tangent and hitting a post.

Skidding at a Curve.—One man was killed and a woman badly injured near Cuddebackville, N. Y., when a heavy Renault roadster skidded at a curve and overturned. So great was the momentum that the car turned completely over and was found some time later with all wheels on the ground.

Driving in Front of Train.—Three automobilists were probably fatally injured at the Carleton avenue crossing, L. I., recently, when they were hit by the Long Island Railroad train. Though the engineer claims to have blown his whistle, as required, 500 yards from the crossing, the driver evidently did not notice the approaching train and drove directly upon the tracks.

View Obscured by Storm Curtains.—A man and his wife were badly injured and the car cut almost in two by a railroad train at Lodi, Cal. They had started home and reached the crossing when the accident occurred. Though the danger signal at the crossing was in working order, they failed to see it because of the storm curtains on the car, and drove directly in front of the locomotive.

Machine Hits Freight Train.—A peculiar accident happened recently at Lafayette, Ind., when two men escaped with sundry injuries. The driver had put on full speed to make a steep grade leading to the railroad crossing. Near the top of the embankment he noticed an approaching freight train, and realizing that his machine could not be stopped in time, swerved toward the oncoming train, hitting it a glancing blow, with terrific force. The presence of mind of the driver thus averted what might have been a serious accident.

A Case of Too Much Drink.—Another wreck caused by "Booze" was recently found abandoned near Waterloo, Iowa. The machine had crashed into a boulevard lamp-post and was much the worse for the encounter. Though the driver was nowhere to be found, the machine was saturated with beer, and bits of broken jugs gave indication that the car had been used to carry this liquid.

Car Hits Wall.—What seems to have been an avoidable accident, and due entirely to carelessness, happened at Washington, N. J., when a woman was instantly killed, five children and a man injured, by the wreck of an automobile against a stone embankment. The car was entirely demolished. This accident occurred while the car was descending a steep grade, and it is thought that the driver lost control of the machine and failed to keep it on the road.

Germans Building Cars.

Berliner Tageblatt, a German publication, calls attention to the great development of automobile building in Germany during the war. The machines now being built are, of course, mostly for war purposes, but it is claimed that the factories will be able to turn out commercial and passenger vehicles in large quantities after the war, both for domestic use and for export.

A New Gasoline Process.

A new process for extracting gasoline from crude petroleum, and said to yield about three times as great as any present process, is the claim of the inventor, Dr. A. H. Ramage. A company has been formed and will control the invention. The Boston Engineering Corp., which concern will have charge of the new process, includes men prominently connected with the automobile industry.

Mapping Truck Highways.

A pathfinding car has been started to map out feeder routes from manufacturing centers in Wisconsin, Illinois, Michigan, Indiana and Ohio to the two official highway routes from Detroit and Buffalo to the Atlantic seaboard, the pathfinder automobile of the Highways Transport Committee, Council of National Defence.

When the trip is completed the government will have four main highways forming connecting links between the great manufacturing centres of the country and the Atlantic seaboard. Motor transports on their way to France will follow these routes and carry cargoes to relieve freight congestion.

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Interesting Kinks and Humorous Things Seen in Various Garages

BY JAMES F. HOBART, M. E.

If a man were to tell about all the interesting things in the garages of the United States he sure would have some job, for it would take most of his life just to run around and see the interesting things and leave but little time to write about them. Why, a man wouldn't even have time to sleep or eat! Reckon I don't want that job!

But, somehow, if a man keeps his eyes "wide open tight" he can see lots of things worth telling about, without taking very much time sight-seeing either. Oftentimes some of the things are seen while walking past a place, without even going inside.

Sidewalk Air Outlet.

One city garage was located on such a busy street that it was not allowed a gasoline pump on the sidewalk, or even a permanently connected hose for the traditional "free air." The matter was gotten around, however, by locating the gas pump inside and running the hose out of doors whenever a car took gasoline.

A "water box" was procured from the Department of Public Works and set in the sidewalk, close to the curb as shown by Fig. 1. A "water box" is merely a cast iron affair about six inches square, inside, and is used in some cities to enclose the water cut-off stem, which leads from the service pipe valve buried frost deep below the ground level. These boxes are fitted with covers as shown in the sketch. The hole in the bottom of the box was about three-quarters of an inch in diameter.

A ball-shaped flange was slipped over the air-tube, to which was fastened a self-closing nozzle for attachment to tire valves. The ball flange was fastened to nozzle in such a manner that the flange could not slip down the tube, then the tube was dropped through the hole in the bottom of the box as shown at A, Fig. 1.

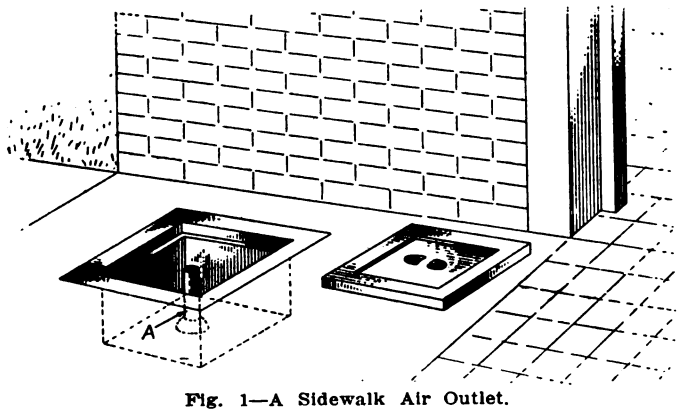


Fig. 1—A Sidewalk Air Outlet.

The tube was made in length equal to twice the depth of the cellar, into which the hole of the water box opened. A sheave, with guards on the side to prevent it from slipping off the tube, was slipped over the air tube, and the latter was then fastened to the air pipe.

When air was needed for a tire, the nozzle, A, Fig. 1, could be grasped and enough of the tube pulled out to reach the wheel with the tire to be filled. The sheave rode up on the tube, as the latter was drawn up and out, and in this manner nearly the whole length of the tube was available, the pulley and weight being able to ride right up to the ceiling. When the tire was filled, it was only necessary to let go of the air tube and it was drawn back into the cellar by the weight, in a manner similar to the disappearance of the flexible cord with which a telephone "Central" makes connection upon the switchboard. These cords are all weighted under the bench through which they project, and retract when dropped by the operator.

The air tube behaved in a similar manner, but the owner of the device advised that no more weight be used with the sheave than was absolutely necessary or the nozzle would eventually be torn from the tube by the repeated striking of the ball flange against the bottom of the "water box."

Humor in Garage Signs.

Some of the signs to be found in garages are surely right to the point, besides being occasionally excruciatingly funny. In one garage is a very conspicuous sign immediately over the work-bench, which reads:

"DON'T TAKE THESE TOOLS UNLESS YOU WANT TO DIE!"

Another garage has a tool cabinet with a place therein for each and every tool possessed by the garage in question. In order to keep "tabs" on the tools, a sign is displayed—and enforced—the writer was advised, as follows:

"EACH TOOL MUST BE RETURNED TO ITS PLACE EVERY SATURDAY NIGHT."

In a garage on Goodfellow Avenue of a certain town, I will not say which town for fear it may be that in which you reside, a sign is displayed which evidently had been written by someone "bothered to death and then some" by people who took things which did not belong to them. The sign was as follows:

NOTICE.

To whom it may concern:

If you want to take something, please take something worth taking, like the Piano or Pool Table or Clock. Please leave tools alone, as they are worth something to us and we need to use them once in a while!

Another man, this time up in the State of New Hampshire, was not as nice in his remarks, which were evidently directed toward the same acquisitive type of person; said remarks, however, were much more direct and emphatic. This notice read:

NOTICE.

The Lord helps the man who helps himself, but Lord help the man caught helping himself here!

Marking Inner Tubes for Patches.

It seems an easy matter to find all the leaks in inner tubes, simply by immersing the suspected tube

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in water and noting where air issues therefrom. But some leaks will not be indicated unless certain precautions are taken. There is a great difference between the leak power of spongy rubber with an ounce or two of air-pressure inside and a tube with 100 pounds pressure. Therefore, if leaks are found upon inflating the tube after it has passed the water tank test, then do not condemn the method as "N. G.," but simply approach a little nearer actual working conditions and try again.

This means: Put a little more air pressure inside the tube and immerse again in the water tank and the slight leak will probably show itself better than it did with the lighter pressure. To be sure, inner tubes must not be over inflated, but you can safely put in pressure enough to stretch the tube to about double its size and by so doing make obscure leaks plainly visible.

One man, whom the writer watched, tested one tube three times, and worked a very neat scheme, something as shown by Fig. 2. The first time the tube was immersed a couple of leaks were found, but they were so small and obscure that it was suspected other leaks existed. While the workman was hunting for other leaks, he lost sight of those at B and C and consequently when he was ready to fit patches over the leaks, he had lost track of them and had to test the tube again to relocate the leaks B and C. The second test developed a small leak at D, and the workman surely had his hands full keeping track of the three leaks and in cutting patches of the right size and shape for them.

Used An Analine Pencil.

The workman sought patiently for the very faint lines which had been traced around the leaky places, then reached for his pencil to mark the breaks more plainly. But the stub of a pencil had disappeared. Before it could be sought for an expressman entered with a package and extended the book and inevitable analine pencil.

The workman had just relocated one of the leaks, and, taking book and pencil, he marked a rough circle on the tube, around the leak, with the analine pencil, dropped the tube and receipted for the package. When he took up the tube again, there was the plainest mark around that leak that could be imagined. The moisture on the tube had transformed the pencil marking into ink, which was found not to wash off easily upon subsequent immersions of the tube.

Here was something worth while; the workman gave it considerable thought, then procured an analine pencil of his own and a couple of clean wipe-cloths from the store room. Upon finding a leak, the workman roughly wiped off the superfluous water, then marked the tube, passing the pencil around the leak, so as to mark exactly the outlines of the patch required by that leak.

It was then a very easy matter to cut each patch to the shape marked out, and the workman found it very easy indeed, after that, to mark the leaks, and at the same time to draw an exact "map" of the patch required. This also made it easy, when putting on the patches, to tell "which one went where!"

It required a third test, with all the air pressure the workman dared use inside the tube, to find two more leaks at E and F. After these had been repaired, the tube held its air perfectly. This workman now wastes very little time in testing tubes the second time; he inflates them about up to the limit, so that if there be any slight leaks, they will make themselves evident. Then, with the "ink-pencil" the tube is marked for patches, in a manner which cannot be mistaken, and which has proved a time saver of many hours in the course of daily garage practice.

Fine Pre-Heating Hearth.

One garage—"Somewhere in Indiana"—which had put in oxy-acetylene welding apparatus a few years ago, so its manager said to the writer, had been greatly troubled to find some simple and ade-

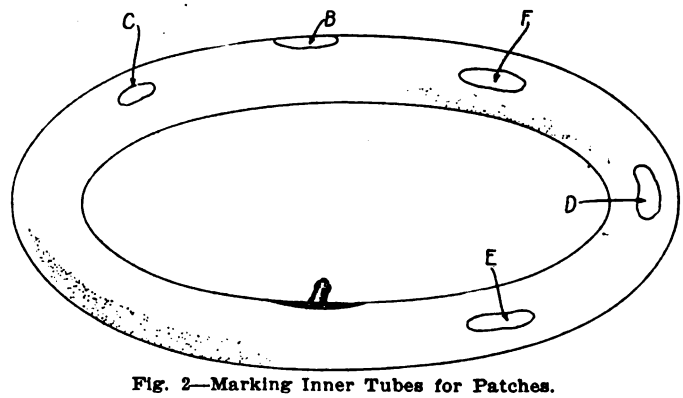


Fig. 2—Marking Inner Tubes for Patches.

quate way of preheating the hundred and one shapes and sizes of broken machine parts, which came in to be repaired. "In cold weather," the manager remarked, "small parts are preheated in the shop heating stove, being placed right on top of the fire and allowed to remain until sufficiently heated.

"But with large pieces it was different. The forge fire is the usual resort in such cases, and proves efficient but awkward, especially when, after being tied up for a job of heating requiring several hours, a rush order comes along for some forgings!

"In order to get rid of that inconvenience and delay, we put in the heating hearth shown herewith by Fig. 3. We took out the shop floor, filled in underneath with earth, spread six inches of sand on top of the earth filler, then paved with fire brick, leaving the latter so they projected about an inch above the wooden floor. In fact, we filled and rammed in sand just level with the underside of the double board floor of the shop. The fire-brick paving then projected as shown at G, H."

Floor Hearth for Preheating.

"The pieces to be heated were laid directly upon the paved hearth, blocked up thereupon as was found necessary, then rough brick walls were laid around the parts as shown at I, J and K, where three separate jobs are being heated at the same time. The bricks are laid up as closely as possible without any mortar or other substance for filling between them, then the walls are roughly levelled off on top and covered with pieces of sheet iron as shown at L, M and N.

"In laying up the bricks, which are merely for confining heat around the parts, openings are left in the walls as at P, P, Q, Q, through which are introduced the blast nozzles of oil heating torches, the hot blast from which eventually brings the broken parts to the required degree of heat.

"When placing the parts previous to heating them, they are so arranged that the welding may be commenced without removing the parts from their po-

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sitions upon the hearth. As soon as the heating has been completed, a few bricks would be removed, or the sheet iron cover slipped aside a bit and the welding commenced, keeping the blast on if necessary.

"Yes, we made the heating hearth large enough for several jobs, and large enough also for the biggest job which is ever likely to come to us. We made the hearth twelve feet square, and it is none too large. In fact, if business keeps on increasing, and I don't see why it should not, as the number of cars in use is daily increasing, we shall put in another section of heating hearth of same size, and located directly adjoining the present hearth.

"Cutting with the oxy-acetylene torch? Sure, we do lots of it. We do a good deal of brazing with the torch, too. But for this purpose we often use the torch with air and acetylene instead of with oxygen and acetylene. It gives plenty of heat for brazing and is not as expensive as the oxygen."

An Automobile "Merry-go-'round!"

Here is a chance for some enterprising "Yankee" who may be on the lookout for a means of making a few dollars. The writer has often seen on the streets of the larger cities small "Merry-go-'rounds" which were built right into horse-drawn vehicles and the revolving seats operated by a man-driven crank. The music was supplied by a barrel organ, which in turn was worked by a boy. The operator of the outfit did the cranking of the revolving seats, took tickets and saw to it that no child got in the way of danger. He also drove the horse while the outfit was under way to new places, during which time the organ boy "fended-off" such enterprising urchins as tried to steal rides or to "hitch behind."

The writer looked the outfit over a bit carefully, with the idea that it could be profitably attached to a Ford or other low-priced car. There were seats for twelve children, the running time was one-half minute in one direction, then the motion was reversed and the seats revolved another half-minute in the other direction. After timing the outfit for nearly half an hour, it was found—the cost of the ride was

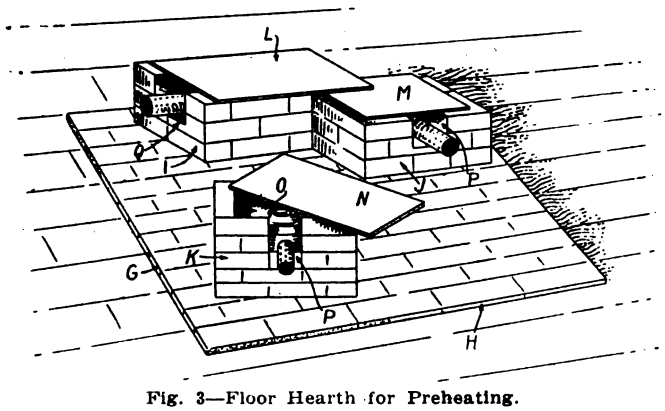


Fig. 3—Floor Hearth for Preheating.

one cent—that during the half hour of observation ten "trips" were made, and only once or twice were the seats not all filled; one "ride" carrying eleven children, another trip ten, all the others, eight of them, having every seat filled.

This averaged a trip each three minutes, and the proceeds of the half hour amounted to $1.17, with a possible $1.20. Pretty good revenue for a horse, a man, a boy and $100 worth of old wagon and revolving seats? Many a good car is rented out for $2.00 per hour and often stands at the curb idle half the time, waiting for passengers. Therefore, it seems to the writer that a very profitable investment for a man inclined to the show business would be to build upon a Ford car a merry-go-'round which would seat 20 children. The engine of the vehicle being made to do the work of propelling the vehicle. driving the revolving seats, operating the organ—though a piano or "hurdy-gurdy" would be better—thus leaving the man free from the crank work and able to give his undivided attention to collecting fares, watching for "Safety First," and properly "Barking" the show. He would be relieved of the expense of the horse and of the boy, and would also be relieved from the crank work, which in itself is no small task.

He could, by selling tickets while a "ride" was going on, have another load all ready for a trip, twenty of them, when business was good, and he might possibly lengthen the ride to two minutes and still make ten trips per half hour, using one minute for unloading and loading again. This would give a possible $2.00 per half hour, $4.00 per hour as a maximum possibility in the earning power of the outfit, with only one man and a Ford engine to keep in operation, and, by introducing an innovation and double-decking the ring of 20 seats, the earning capacity of the outfit could be increased to a maximum possibility of $8.00 per hour! Worth looking into, isn't it?

Stuck in the Snow.

The writer chanced to be in Memphis, Tenn., about the first of December, 1917. Was there when the mercury dropped clear to zero, and ten inches of snow dropped with it in a single night, and if ever anything was paralyzed by snow and cold, it was the automobile business of Memphis. They don't have such weather there very often, and when it does come they don't know what to do with it, so it "does them!"

Within radius of a block from my room on Court Street the morning after the storm I counted thirty abandoned cars. I enjoyed many a quiet laugh while watching little converted service cars trying to pull big automobiles out of alleys and along the slippery, snow-clogged streets.

The converted cars didn't know how to do it, and the drivers were equally "green." The number of tow-ropes broken that day in Memphis must have been something large. One little converted Universal Motor Runabout in particular buzzed around like a veritable wasp. The driver would make a hitch to an abandoned, frozen car and try to pull it. Instead of going somewhere and loading the body of his car with pig-iron or sand, so as to get some traction power, the driver made a hitch and pulled time after time while the chains on his car wheels as they spun around cut the snow like buzz-saws. Then the driver tried backing away and "jerking" on the rope. This resulted, as it must have done. in breaking the rope as fast as he could tie it.

Then he tried pushing the dead car, with no better results, and then went away after a heavier car to pull with. Just after he left, a friend of the "abandoned" owner came along with a heavy car, took the dead car in tow and vanished. There was quite a tableau when the driver of the little "wasp" returned with a heavy truck and there was no abandoned car to be found!

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Difficulties Encountered in Using Present Day Gasoline and Heavy Fuels

A Non-Technical Analysis of Troubles Arising From the Use of Fuels With High Vaporizing Points in Gasoline Engines of the Older Types

Though the average automobilist realizes that a lot of his engine troubles are due to heavy fuel, he does not know just why present-day gasoline will not give as great mileage as did that liquid, with the same name, in days gone by. It is the purpose of this article to make the matter clear to the reader.

It is a well-known fact that kerosene contains more heat units per measured quantity than does an equal amount of gasoline, and heat units may be considered in this case as being power units. As gasoline grows heavier it contains more of the kerosene element, and present day fuel contains a large percentage of kerosene with a very small percentage of actual gasoline.

Greater Mileage.

We may assume, then, that the present fuel should give greater car mileage per gallon than gasoline, a fact that does not seem to be true from actual experience. The answer to this peculiar question is that the carburetor cannot take care of all the fuel and bring it to its vaporizing point.

Engine power is greatly dependent upon the force and speed of the explosions in the cylinders. If the gas in the cylinders burns slowly, the expansion takes place gradually and the engine will have no "pep," to use a universally accepted expression.

The mixture of gasoline and air in the cylinders may be likened to a mixture of gunpowder and sand. If one were to mix some very fine sand with a quantity of very fine gunpowder and touch a match to the mixture, chances are that the whole mass would explode quickly, for the fire would leap from one granule of the powder to another. If the powder were extremely fine, the action would be quicker, for the mixture would be better.

Suppose, however, that instead of using fine gunpowder, one were to try the same experiment with extremely large pieces. Perhaps one of the pieces could be lighted, and would burn briskly, but the flame would not pass to all of the other fragments, and so much of the powder would remain unconsumed. In any event there would be no explosion.

The fine gunpowder and sand mixture may be likened to a well gasified fuel, while the second mixture could be compared with a poorly carbureted gasoline. Engineers term such mixtures, dry and wet respectively.

At A, in the accompanying illustration, is shown the intake manifold through which a wet mixture is passing. One will note that the fuel is in the form of drops and that all of it is not mixed with the air. The gasoline at the center of the drops will not have time to explode in the engine and will be driven out of the exhaust or condense upon the cylinder walls, resulting in a great loss of efficiency.

Another point to note in this illustration at A, is that the wet mixture has a tendency to condense in the manifold, particularly at the inside of the bends where the velocity of the passing gas is not great. This fuel will gradually "load up" until it overflows, so to speak, and when the engine is speeded up quickly it will be drawn into the cylinders in its liquid state, quenching the explosion flame, and decreasing the engine power.

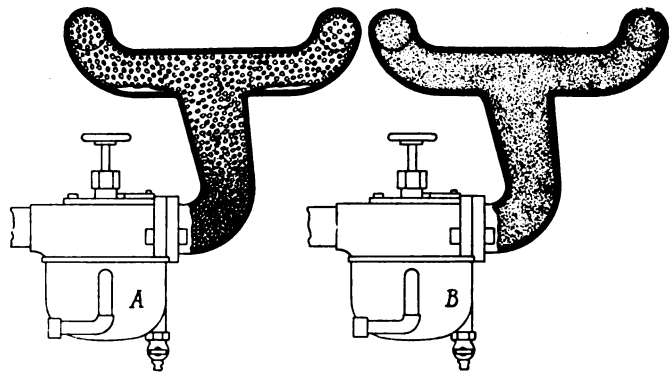
The Dry Mixture.

At B is shown a dry mixture passing through the manifold. In this case the fuel and air are properly mixed and the explosion will be sharp and quick. Each little molecule of the liquid carries its proportion of air, and in itself is explosive. Being in a finely divided state, it will not condense upon the manifold or cylinder walls so quickly as would a wet mixture, and so it may be said to be efficient.

Now gasoline is very much like water in one respect, when heated it gives off a wet vapor; as the heat increases the vapor expands and, like superheated steam, is dry and resists condensation. Working upon this fact, engineers have arrived at the conclusion that the real solution of the heavy fuel problem lies in the proper application of heat to the fuel.

To secure any degree of efficiency from his engine, every operator should look to the carburetor hot air connection and be sure that it is not obstructed with dirt or carbon. If he is using one of the combination exhaust and intake manifolds which are obtainable in many designs, he will probably find that he is getting good mileage, for in this case the fuel drops are superheated before entering the cylinders.

The second problem that often arises when one is using the present heavy fuel is the high compression factor. As everyone knows, any liquid is compressible only to a very limited degree; it is one



Illustrating at A, Wet Mixture; at B, Dry Mixture, in Manifold.

of the reasons why water is used in the hydraulic press, and why oil is used in the well-known door-check.

As vapors or gases increase in liquid content, their compressibility decreases. In the old grade of gasoline the vapor was compressible to a great extent and engines were designed to have cylinder compression of from 65 to 100 pounds per square inch, and in many cases higher.

With the heavier fuel, however, the gas could not

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be put under such pressure with satisfactory results and the average cylinder compression is below 65 pounds.

Bearing these facts in mind, one can see just what will happen when one of the old type engines, a 1910 model for instance, is used. In many cases the firing chamber will be too small to hold the volume of gas taken in on the suction stroke, and the piston will come up against what might be almost a solid body of liquid fuel, resulting in a decided knock.

Should the piston rings be poorly or loosely fitted, the fuel will be forced past the piston and into the lubricant in the base. This is why an old, overhauled engine causes trouble in many instances from burned out bearings due to diluted lubricating oil.

Should an overhauled engine of old design evidence any of these troubles, it should be inspected carefully, the compression taken, and if too high the piston heads turned off slightly, the firing chamber enlarged, or the cylinder head gasketed a little higher than normal.

One should observe the utmost care and keep the lubricant in the base to its maximum efficiency and as soon as it begins to show dilution it should be drained and new oil put in.

ADJUSTING PINION GEARS.

Correct Methods to Be Used in Re-assembling the Differential.

BY GEORGE A. LUERS.

Many owners are surprised, after re-assembling the rear axle, in which worn bushings are replaced and possibly new gears installed, that after two or three hundred miles of running, broken edges of gear teeth are found in the grease. The first evidence of trouble is an unusual thump in the rear axle when the car is started. The lubricant, being stiff, picks up the gear particles, and these revolve between the teeth of the meshed gears.

This trouble is the result of improperly meshed gears, which is the direct cause of the most trouble in an overhauled axle. A brief outline of the construction of the gears will give the amateur repairman an idea as to the reason for the correct meshing of these parts, in order for them to transmit the engine power, without crumbling and breaking at the edges.

Gear Construction.

A gear tooth of the straight bevel, or spiral bevel type, is of a different width at every point of its length, tapering so that the sides of the tooth, if extended to that point, would meet at the exact center of the shaft. The teeth of the large and small gears are of the same size at the extreme outside of the tooth. They are measured off at this place on the uncut gear blank and shaped on the gear cutter so that the tooth sides of the meshing gears will intersect at the point where the centers of the shafts on which the gears are fastened cross.

Considering the accurate machinery necessary to shape the teeth, with the extreme outside ends as a guide, the gears can only be correctly meshed when these outside ends of the teeth on the two gears are flush, since this gives a contact area, as intended, extending the whole length of the tooth side.

If the tooth ends overlap, as they frequently do, the engine power is transmitted by the extreme outside ends of the teeth at one point of contact only, and this condition results in the breaking of the tooth edges. The teeth are case hardened and the surfaces will not give as would softer metal, for the hardened surface is brittle and crumbles when the pressure is not evenly distributed.

Making the Adjustment.

A differential housing with a removable plate at the rear permits making the adjustment of the gears, either by placing the hand inside the case to feel if the tooth ends are flush, or inspection, using a small dentist's mirror and a flash lamp. On a housing, not fitted with a detachable plate, such as the Ford, the gears should be adjusted to mesh properly, by bolting the driving shaft housing to the left axle housing, with the gears in place, leaving the right side of the housing off. This permits close inspection to see that the gear teeth are flush. Adjustment of the bearing can be made with washers or shims to bring the gear teeth even.

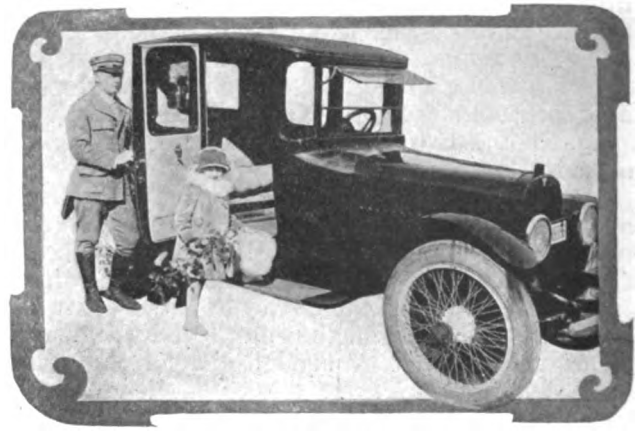
The next procedure is to obtain proper working clearance between the teeth, which should be from .001 to .0015 of an inch apart to allow for expansion, due to slight heating of the parts in operation and for an oil film between the surfaces. The clearance may be found simply by using thin tissue paper or cigarette paper. When the gears can just be revolved by hand, with the paper between the engaging faces of the gear teeth, the gears are the proper distance apart.

Test the large or ring gear at several points and be certain that it does not bind at any place. If the gears mesh deeper at one place than at another the bolting face of the large gear is not true, or the end of the drive shaft is sprung. Either fault should be corrected.

The short time required to make this adjustment is well spent, for, properly made, the axle gears will give good service only if properly adjusted.

Cars Increase in Wisconsin.

Wisconsin dealers are not downhearted and anticipate a big season despite war conditions. The registration figures show that the Wisconsin dealers sold nearly 49,000 cars in 1917, or a gain of nearly 42 per cent. over the previous year. In 1917 there were 164,531 cars registered against 112,637 of the previous year. It is estimated that there is a car to about every 17 persons. There are 2,167 dealers.



This Is Baby Marie Osborne, Talented Pathe Film Star and Probably the Best Known Child Actress in the Motion Picture World. She Is Shown Here Starting for the Studio in Her Hudson.

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Interesting and Time Saving Devices Seen at the Boston Automobile Show

The Boston Show, this year, opened in what might be well termed "a blaze of glory" and though the exhibits were, as a general rule, very similar to those of last year, there were many that attracted much attention.

The general layout of the floors was similar to that of last year, the main floor being devoted to passenger car exhibits, the basement to motor trucks, and the second floor and balconies to accessories.

"Conservation" seemed to be the keynote of the whole show; the salesmen of cars talked high car mileage, truck manufacturers talked low upkeep costs, while the accessories for increasing car mileage and obtaining maximum efficiency were great in number.

Despite the fact that this year promises to be one wherein the "Used Car" will be in its glory, because of the decreased car production, there was little or no apparent falling off of the new car exhibits. The main floor was attractively trimmed and the exhibits were well arranged in harmony with the decorations.

Due to the fact that there will be many old cars kept in service, interest seemed to center around the accessory displays on the second floor. Every accessory that one might imagine had its place and one might, with judicious buying, equip his car with devices enough to put it into the same class with a new car.

In the accessory department might be found many handy tools for the repair man; devices which would enable him to do better work in less time than he might with old equipment or by hand. A trip to the show might well have been considered as an educational tour.

It would be manifestly impossible to check up with detail the interesting accessories shown and it is our intention to give a brief description of those which seem to attract the most interest and make for most efficiency.

The Roedding Signal.

One of the exhibits which might be said to be interesting, from a humanitarian standpoint, was that of the Roedding signal, shown by K. G. Barkoot of Detroit, Mich. This device, illustrated at A, was designed first to prevent rear-end collisions and second to facilitate traffic. Upon the steering wheel was mounted the control dial having the four marks, stop, left, right and back.

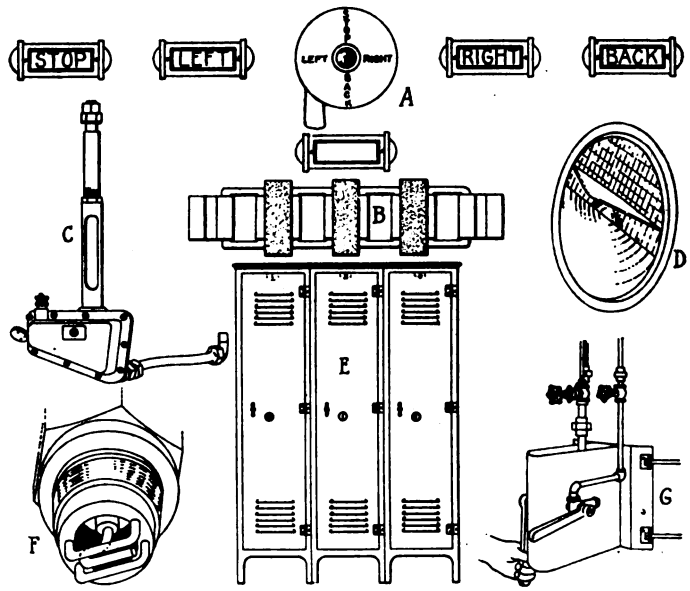
At the rear of the car was provided a tail light, one end of which was fitted with a white glass for illuminating the number, the other end with a green lens. The driver had only to turn the disk to the desired location and press the button when the proper signal would be shown upon the red glass at the rear. Being wholly operated from the seat, the device is simple and should prove of great value to the present day automobile owner doing more or less traveling through the cities.

Crowe Fan Belt.

Considerable interest centered around the exhibit of E. L. Thompson Co., 817 Boylston street, Boston, Mass., who represented the Crowe mechanical fan belt. This product is applicable to practically any engine device requiring a light belt drive and consists primarily of but three pieces, a solid steel link, a wire link and a leather friction block. With these three units, the belt may be built to practically any length as shown at B.

Mack Safety Oil Gauge.

Ford owners who had been troubled during the past by engine lubrication were particularly pleased by the exhibit of the Mack Safety Oil Gauge Co., 14 State street, Boston, Mass. This oil gauge is designed to attach to the lowest portion of the Ford oiling system, beneath the flywheel, and consists of a glass indicator and a special electrical device connected with the ignition circuit. If for any reason



Interesting Accessories at the Boston Show. A, The Roedding Signal Outfit; B, Crowe Fan Belt; C, Mack Automatic Safety Oil Gauge; D, Holophane Headlight Lens; E, Hart & Hutchinson Locker; F, National Spark Plug; G, Pneumatic Garage Door Control.

the lubricant should fall below its proper level, the engine immediately becomes inoperative.

Holophane Lens.

There were scores of various headlight lenses in evidence at the different booths, but none attracted more attention than did the Holophane, which was exhibited by the distributors, Wetmore-Savage Co., 76 Pearl street, Boston, Mass. By referring to sketch D one will get a general idea as to the design of this lens. The upper portion is made up of a number of prisms in a checker board effect. At the center is a bull's-eye arrangement, while the lower part is cut by a number of semi-circular corrugations. Projecting from a line slightly above the center is a translucent fin, which is designed to filter the direct rays of light and prevent them from dazzling the eyes of an approaching driver. It is claimed that this lens complies with the various headlight laws throughout the country.

All Steel Lockers.

Garage owners are beginning to realize that in order to keep their men satisfied with the work

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they must provide suitable accommodations for the workman's clothes. All-steel lockers exhibited by the Hart & Hutchinson Co., New Britain, Conn., were attractive, and from the garage man's standpoint the type B-C single-tier locker was perhaps the most practical. This locker is made of heavy steel reinforced and so designed that it may be used singly or combined with any number of units. Each locker is provided with a heavy door which may be had ventilated at the top or bottom, or fully ventilated throughout its length. Each door is provided also with a special key. A three-locker combination is illustrated in our sketch at E.

National Spark Plug.

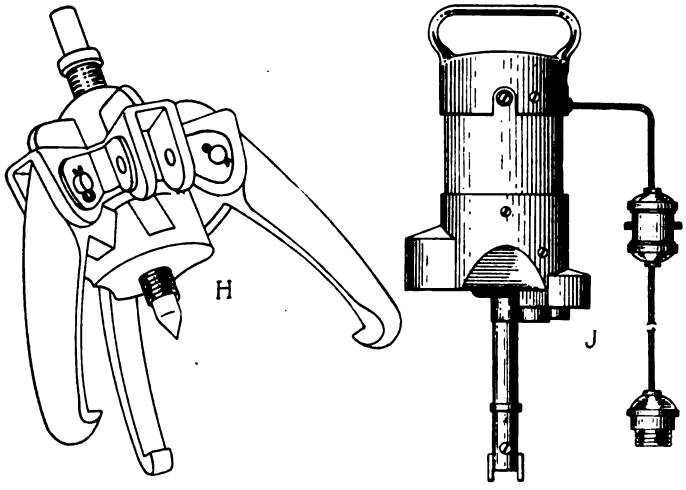
Something distinctly new in the line of spark plugs was exhibited by the Bergie National Spark Plug Co., Rockford, Ill. This plug has two large electrodes connected with the base casting. Between the two electrodes is the third or center insulated terminal, so arranged as to present approximately one inch of firing surface in the cylinder. The firing end is illustrated at F.

Pneumatic Door Control.

Among the exhibits which might be said to make for comfort was that of the Foss-Hughes Company, Market street, Philadelphia, and called the pneumatic control for garage doors. This control is a device for operating any type or size of swinging, folding or rolling doors and may be placed at practically any part of the building. Through the control box compressed air is released from and injected into a cylinder, which then automatically opens or closes the doors. The main control may be augmented by as many other controls as desired. One of the many advantages claimed for this sort of device is the conservation of the heating through the quick opening and closing of doors, thereby preventing drafts and permitting the building to be kept heated uniformly.

Beach Grip Puller.

The Greb Company, 172 State street, Boston, Mass., drew the attention of many repairmen by their Beach automatic grip puller. This device consisted mainly of a large heavy body casting, fitted with four lugs into which might be placed large hooked jaws. Sliding in the large casting was the center member which carried the pressure screw. The center member was slotted to receive projections on the jaws. In operation, pressure upon the screw presses the center sliding member in the casing and automatically brings the jaws toward their common center. The greater the pressure the tighter the jaws hug the piece. The device is arranged to take either three or four jaws. A locking lever at the top is arranged to hold the center sliding member in place. A good idea of how this device looked may be obtained from glancing at sketch H.



Two New Tools at the Show. H, Beach Automatic Grip Puller; J, Stenman Electric Valve Grinder.

Stenman Electric Valve Grinder.

Garage owners who were on the lookout for time-saving devices, were attracted to the booth of C. W. Frohock, 493 Park avenue, Boston, who represented the Stenman Electric Valve Grinder. This machine is designed to operate from the lighting circuit and is so made that the grinding shaft, upon which the valve tool is mounted, has an oscillating motion, rather than purely rotary.

With this device, illustrated at J, it is claimed a mechanic may grind valves in one-quarter of the time ordinarily taken by the old hand method. The shaft is designed with removable valve tool heads, and any type of valve may be ground with the outfit.

THE THIRD LIBERTY LOAN.

Perhaps no industry should be more grateful to the Government at this time than that of the automobile. This branch of work has been benefited by war contracts, and it is only natural that the Government should look to the automobile industry to do their part in the third Liberty Loan campaign which will open on or about April 6th, the first anniversary of our entry into the war.

The large cities will follow out the same general lines of canvassing this year as were pursued in both the previous loans. That is, the Liberty Loan committees in each metropolis will appoint a committee chairman for each industrial committee. This chairman will choose several associates. Bond salesmen and speakers will be furnished by a central speakers' bureau. Then, as a separate and individual working unit, the industry will solicit subscriptions from members of the trade.

Last fall, nearly $5,500,000 was raised in this way among automobile men in the Second Federal Reserve District with headquarters in New York. Other large cities made correspondingly good returns.

The ever-increasing expenses of financing the war make it imperative that the Third Liberty Loan shall be oversubscribed by many millions of dollars. The war budget has increased at the rate of $100,000,000 a month for the past three months.

With a second draft army to be clothed, fed and equipped, more and more money will be needed constantly. This money must be provided by the people. Our total outlay in money during the first ten months of the war was $7,100,000,000. Of this sum $4,000,000,000 went to England and France in loans. Announcement of further loans to our allies is expected daily.

Strange to say, figures show that, in spite of this seemingly heavy drain, we have not as yet scratched the surface of our national resources. Two and eight-tenths per cent. represents all that we have spent at war so far. Germany's total war costs to date are estimated to have consumed 33 1/3 per

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cent. of her total resources. These figures indicate the distinct advantage that we would hold over our adversary in the event of a long, drawn out struggle.

One important reason for piling up vast stores of money now is to have a reserve on hand to meet Germany's spring and summer drives. All during the winter she kept rolling up her heavy caliber guns to the western front. At the same time, hundreds of thousands of men were released from the Russian frontier. They were hurried across the continent. Hindenburg, Ludendorf and the other German war lords realize that they have got to "show the German people something" if they expect further sacrifices in blood and money. A big gain over the French and English would cheer up the discontented army of workers at home. A setback would so arouse antagonism among the masses that further fighting would be impossible. The Socialist influence, alone, would compel the Kaiser to sue for peace.

So that is why the coming loan must "go over," and go over big. It is not an exaggeration to say that the success of the war hinges upon this loan. Banks and employers will again make easy the purchase of bonds by men and women of moderate means. Only a small initial payment is necessary to secure a $100 or $200 bond. Weekly instalments will do the rest.

Many men and women, who ordinarily bank a stipulated sum each month, are now laying away half the amount for Liberty Bonds. All sorts and manners of sacrifices by loyal Americans have been reported.

A feature of the coming campaign is the vast amount of advertising matter that has been prepared. Every city and town throughout the nation will be painted red, white and blue by April 6 next. Over 9,000,000 posters by some of the most famous artists in the land have been scattered broadcast. Thousands of folders, circulars and pamphlets have already been mailed. Painted signs will appear over night on house tops, offices and sub-treasury buildings. Banks, too, will glisten with enormous signs.

NEW BOOKS RECEIVED.

Acknowledgment is made of the following books and house publications:

The Gas Motor. By Max Kushlan, B. S., Assoc. M. W. S. E. A well written book dealing with the principles of gasoline engines and automobiles. Very non-technical and written so that the layman should have but little trouble in understanding it. Published by The Branch Publishing Co., of Chicago, Ill.

Upholstery and Top Materials. Du Pont Fabrikoid Co., Inc., Wilmington, Del. A booklet dealing with the three grades of Fabrikoid used on passenger and commercial cars. Interesting facts in connection with the manufacture and uses of the products, Motor Quality, Truck Special, and Rayntite, are given. Copies may be had by writing the office of the company.

Concrete Highway Magazine. Published by Portland Cement Association, 111 West Washington St., Chicago. An interesting book devoted to concrete roads, well illustrated and containing much information. Price 50 cents the year.

Aviation Engines. By Lieut. Victor W. Page. A very exhaustive treatise on aviation engines and covering the various types in use. As a source of information this book should be valuable to anyone interested in airplane work. Published by The Norman W. Henley Publishing Co., Putnam Building, New York. Price, $3.00.

Location of Aviation Power Plant Troubles Made Easy. By Lieut. Victor W. Page. This is a large wall chart, showing a typical airplane power plant in part section and all important components. Tables giving an outline of possible troubles are printed upon the chart. Published by The Norman W. Henley Publishing Co., Putnam Building, New York. Price, 50 cents.

Reo Truck News. House organ published by the Reo Motor Car Co. of Lansing, Mich. Sent upon application.

The Truck-Smith. House organ published by the Smith Motor Truck Corporation, Chicago, Ill. Price, $1.00 a year.

Drill Chips. A booklet containing many well put facts about present day business. Published by The Cleveland Twist Drill Co., Cleveland, Ohio, and distributed upon request to the trade.

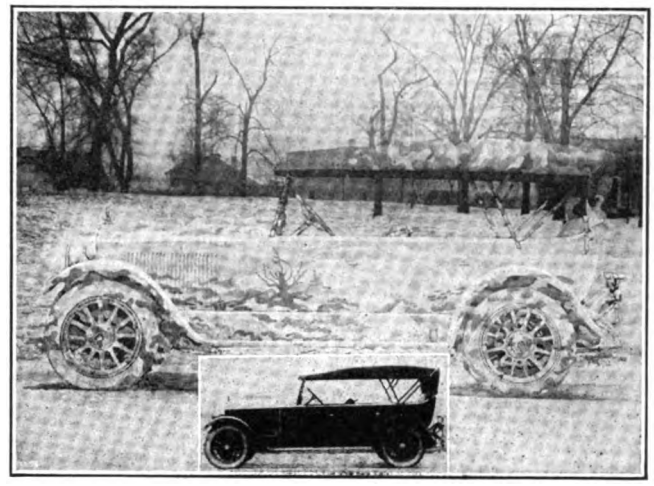
Milestones. House organ of the Firestone Tire and Rubber Co., of Akron, Ohio. 50 cents a year.

CAR CAMOUFLAGE.

An Interesting Instance of Deceptive Automobile Painting.

The deceptive coloration of the implements of war has become one of the most vital elements of the present great conflict. All manner of illusions have been practiced to deceive the eyes of the enemy.

Motor trucks, tanks, machine guns, bridges, roads —even the soldiers themselves—have been camou-



An Interesting Instance of Automobile Camouflage.

flaged, as they call it, to say nothing of the battleships and airplanes that without exception are so decorated as to render detection next to impossible.

Wondering how far this new art might be carried, several of the men in the paint shop of the Cole Motor Car Company at Indianapolis secured the permission of J. J. Cole, president of the company, to camouflage one of the new Cole Aero-Eights.

The result is shown herewith. In the small panel at the bottom is a photograph of the car before being camouflaged. The larger picture shows the car after receiving its coat of protective coloring.

The task was rendered exceedingly difficult because of the fact that the Aero-Eight had to be camouflaged against a landscape of snow. However, the result appears to have been very successful.

Motor Car an Essential.

The Montreal Automobile Trade Association has offered prizes to public school children under the age of 15 for essays on the subject, "Why the Motor Car Is an Essential." It is expected that the contest, which is being carried into all of the schools, will cause the children to ask questions of their parents, thereby bringing their attention to the fact that the motor car is one of Canada's most essential articles.

Manning, Splitdorf Sales Manager.

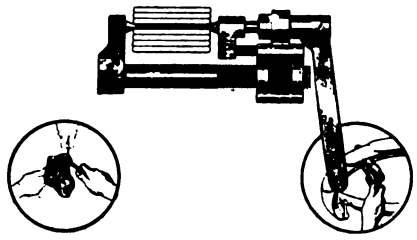
F. C. Manning, well and favorably known in the automobile industry and prominently identified in the electrical ignition business, has been appointed general sales manager of the Splitdorf Electrical Co., Newark, N. J. He will make his headquarters at the main office and will retain his presidency of the Sumter Electrical Co., a subsidiary of the Splitdorf Co.

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NEW AND INTERESTING THINGS IN MOTORDOM

Weise Leaf Spring Spreader.

Every motorist knows, or should know, the value of spring lubrication. Perfectly lubricated springs give that resilient action characteristic of high class cars; poor lubricated, they often rust into a mass of solid iron and do not function at all. The Weise Leaf Spring Spreader, manufactured by A. F. Weise, 133 W. Washington street, Chicago, Ill., is a handy little tool designed to be used for spreading apart the spring leaves. It is provided with two adjustments, a slow feed for ordinary purposes, and a rapid lever action. The device is made to take in springs varying from 1½ to 2¾ inches in width. The device is used as follows: The slow speed knurled nut is turned until the two jaws can be slipped over the spring with the lever



Weise Leaf Spring Spreader Applied.

extended. With the jaws against the groove between the leaves, the lever is pressed downward, driving the jaws between the leaves and permitting the insertion of graphite or other spring lubricant.

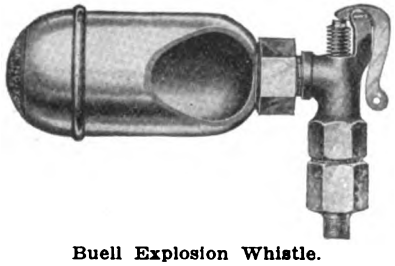
Buell Explosion Whistle.

The need for an effective warning device for motor cars and trucks was never so apparent as to-day. Daily accounts of accidents to pedestrians and property emphasize this fact and has resulted in a great number of warning signals being offered to the public.

One of the most effective devices so far presented is the Buell Explosion Whistle, manufactured by the Buell Manufacturing Company, 1610 Michigan avenue, Chicago.

This whistle is the invention of Mr. Buell and is claimed by him to be without an equal in certainty of service and long life. The Buell Explosion Whistle is first of all not a horn, but an actual whistle which screws on the motor in place of priming cap and is blown by the direct explosion, pressure of which ranges from 250 to 300 pounds to the square inch, thus securing certain and efficient operation at all times.

Being constructed of strong metal the



Buell Explosion Whistle.

Buell Explosion Whistle is practically indestructible and will outlive any car. It never requires cleaning or attention of any kind.

Mr. Buell reports that at the present time 25 of America's largest manufacturers of automobiles and motor trucks are utilizing the Buell as standard or optional equipment on their cars.

One Minute Swivel Repair Link.

A combined swivel and chin repair link (patented) is the unique invention re-



One Minute Swivel Repair Link.

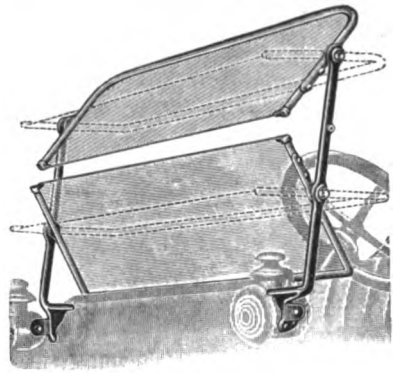
cently placed on the market by the Cleveland Galvanizing Works Co., of Cleveland, Ohio.

Although it has been on the market but a short time, the One-Minute Swivel Repair Link, as it is called, has found considerable favor among chain users because of its versatility, strength and simplicity, being constructed of but three parts, which can be put in place in the chain with a hammer, pair of pliers or a vise. It may be used with welded, weldless, or flat link chain and is furnished in three sizes for use with the different sizes of chain.

An interesting folder has been issued, describing and illustrating the repair link, copy of which can be had by writing the manufacturers.

Ospeco Ventilating Windshield.

Now that summer is at hand the regular Ford windshield does not fully an-



Application of Ospeco Windshield Parts.

swer the purpose, for it does not permit sufficient ventilation for keeping the lower part of the automobile body cool.

The Michigan Auto Products Co., Department F, Ford Bldg., Detroit, Mich., manufacture what they term as Ospeco windshield parts, consisting of two heavy brackets which attach to the front section of the Ford body and carry the regular Ford windshield in such a way that the two halves may be tipped in practically any direction as shown in the accompanying illustration.

Krom-Nik Gears.

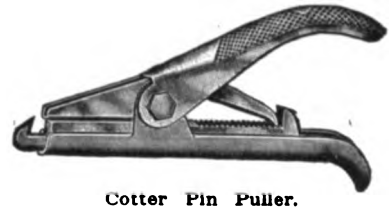
For many purposes the present Ford Gear Ratio is not entirely suitable. This is especially true of Ford cars used for heavy duty service where a lower ratio is desirable.

The Krom-Nik Gear Company, 910 Michigan avenue, Chicago, Ill., manufacture a pinion and Master Gear outfit applicable to the Ford differential which gives a ratio of 4.2 to 1, which is said to be the lowest gear reduction possible in a Ford axle.

Should one desire a racing gear the same company manufacture a 3 to 1 ratio outfit.

Cotter Pin Puller.

The average mechanic realizes the great loss of time in removing cotter pins from inaccessible places and knows that the screwdriver or bent nail method is far from efficient. A device has recently been put on the market by the Brewer-Titchener Corporation of Cortland, N. Y., which is designed for removing cotter pins. In general appear-



Cotter Pin Puller.

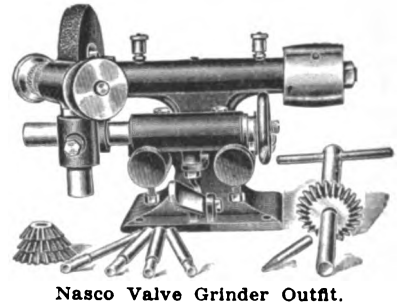
ance it resembles the ordinary conductor's punch, but upon the jaw end is a small hook which is inserted in the cotter pin eye. The pressure upon the handle pulls the cotter pin from its place.

Double Service Tires.

I. Jaffess, with stores at 1319A Fifth avenue and 241 West 54th street, New York City, announces a double service tire consisting of two standard make tires bound together in such a manner that each adds strength to the other. These tires are said to give at least 6,500 miles of wear and are being introduced to many automobile owners throughout the country.

Nasco Valve Grinder.

To give satisfactory results, engine valves must be kept in condition, and so require frequent grinding. Every machinist who has had occasion to reface hard steel valves realizes that this work cannot be done satisfactorily on a lathe, but requires a grinding wheel. The Nasco Valve Grinder, made by the National Auto Specialty Mfg. Co., of Tama, Iowa, is designed in such a way that valves of practically any size may be resurfaced. This machine is driven by belt and fitted with a fine emery wheel, set at right angles to the valve holding device. With the refacing tool may be



Nasco Valve Grinder Outfit.

had four reseating cutters and suitable guides for repairing the valve seats.

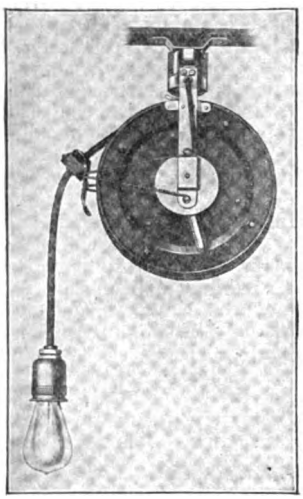
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Gill Piston Rings.

The Government's action in restricting the production of automobiles and the utilization of some of the factories for war work, means that many old cars, which formerly would have been sent to the scrap heap, will this year be overhauled and used again. Nearly all repairmen realize that the so-termed "leak-proof" ring is superior to the diagonal cut one, and are installing such rings in all overhauled cars. The Gill piston ring is one of the leak-proof type and is a simple self-fitting, one-piece ring of sturdy construction. The unique construction of the joint is said to double compression, thereby saving gasoline and oil and adding power to the engine. This ring is made by the Gill Manufacturing Co. of 350 West 59th street, Chicago, Ill., in sizes to fit practically any standard engine, and in oversizes for rebored cylinders.

Automatic Extension Reel.

This device should be of great interest to the machinist or garageman who has occasion to use an extension lamp for work on machines. It consists of a nine-inch drum upon which is wound 25 feet



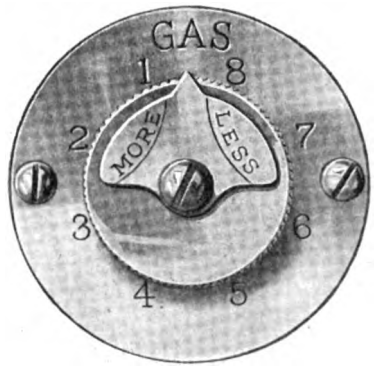
Automatic Extension Reel.

of reinforced cord with suitable connections. The reel is mounted upon a swivel ceiling bracket and can be turned in any direction. In order to operate the device, the lamp is grasped and pulled out in any direction to the desired distance. When this point has been reached, the lamp is slowly dropped back a few inches, when a ratchet on the drum catches and prevents further rewinding. The whole action is comparable with the ordinary window shade attachment, and is desirable because it keeps the flexible lamp cord away from the floor and prevents the attendant wear of the insulation. The device is manufactured by the Cincinnati Specialty Mfg. Co., of Cincinnati, Ohio.

Standard Carburetor Control.

Every driver of an automobile realizes the importance of the gasoline control, for he knows that if properly controlled his carburetor will give its maximum mileage.

The Ford needle valve adjustment on the dash is not very accessible and is often neglected. The Standard Carburetor Control manufactured by the Standard Thermometer Company, 65 Shirley street, Boston, is a device consisting of an instrument board indicator and a shaft connection. The indicator dial is divided into a number of points and fitted with a knurled knob. For starting the engine, the knob is



Standard Carburetor Control Indicator.

turned toward the left, giving more fuel. As the engine warms up the knob may be turned toward the right, cutting down on the gasoline and allowing the engine to be operated at its maximum efficiency.

Yankee Tap Wrench.

No branch of mechanics presents so many extraordinary and difficult jobs, in "hard-to-get-at" places, as automobile repairing. For this reason automobile tools must be "ingenious," and it is said that the "Yankee" tap wrench is of this kind. This device is manufactured by North Bros. Mfg. Co., of Philadelphia, Pa., and is designed to enable the largest possible number of movements or adaptations, with the fewest possible interruptions or removals from the work. The upper end is fitted with a sliding cross-bar, which is held central or at either end by a friction device. This feature, together with the right and left ratchet and rigid attachment, makes almost any job possible. The sliding ratchet shifter on the barrel is controlled at a finger touch, while the knurled thumb-piece at the top makes tap-starting easy, and also enables rapid backing out at the finish. The countersunk top of the thumb-piece permits the tool to be accurately centered on a lathe for tapping, or even for holding small drills. The Yankee tap wrench comes in three sizes.

Tire Doh.

The average motorist has begun to realize that tire mileage can be increased greatly by careful attention to the tires. Oil and water, two liquids which do more



The Tire Doh Outfit.

damage than actual wear, must be kept from the tire fabric or disintegration will be rapid. Tire Doh, a product sold by Atlas Auto Supply Co., 616 W. Austin avenue, Chicago, Ill., can be used for tire or tube repairs and comes in an attractive box with full directions. To promote sales and co-operate with dealers, the manufacturers furnish an attractive display for trimming sales windows.

Wells Self-Opening Die.

The Greenfield Tap & Die Corporation, of Greenfield, Mass., have just published a non-technical book dealing with the many uses and advantages of their product, the Wells Self-Opening Die, a device made in a number of sizes and styles, both for lathes and automatic screw machines.

Every repairman or machinist interested in this product should write for one of these interesting little books.

Saturday Evening Cash Register.

The Metallurgical Laboratories of Paul G. Niehoff & Co., formerly located at 350 N. Clark street, Chicago, have been removed to 232-242 E. Ohio street, Chicago, the change being rendered necessary by the large increase in business. This company announces the publication of an interesting little booklet entitled



A Bright Little Booklet.

the Saturday Evening Cash Register, a little paper designed to promote the interest of their organization and give valuable little pointers on the manufacture of their products. The articles are "up to the minute" and should be of great interest to every reader.

Little Giant Starter.

A device which should be of great interest to every Ford car driver is sold by the Little Giant Starter Co., of Canton, Ohio, and known as the Little Giant Starter. It consists of a foot pedal and a length of chain which is fastened through suitable adjusting device to the engine crank shaft. Pressure upon the foot pedal turns the engine over, enabling one to start the machine without leaving the driver's seat. When not in use the foot pedal locks against the dash out of the way. The whole installation is very simple and can be performed in a very short time.

Maco Accessories.

The Motor Accessories Corp., of 170 Broadway, New York City, announce that they are putting out an interesting line of accessories and request live dealers to correspond with them.

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New-Type-F Equipment.

A noteworthy improvement has been made this year in the New-Type-F Equipment of the Akron Rubber Mold & Machine Co., makers of the well-known line of Tip-Top Ti-Re-Pair Outfits.

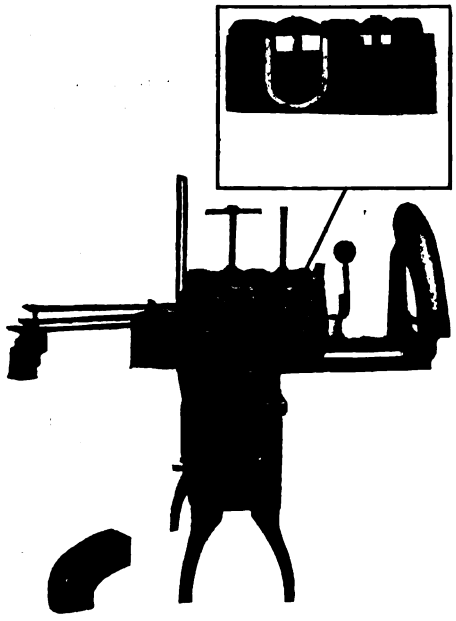
One of the cavities has been increased in size from 2½-3" to 3½-4", and provided with a reducing shell to take the 2½-3" size. The other cavity remains the same as last year—4½-5". It will be seen that this permits two popular size tires to be cured at the same time, doubling the capacity of the equipment on this particular class of work on which every tire repair shop always has a large amount. At the same time the less-called-for smaller work can also be handled so that the outfit shop does not have to turn down any work that comes in.

The New-Type-F Equipment is also fitted with Inside Patch Attachment 3½-4", on which practically all sizes of inside work can be handled. Each outfit is equipped with set of Bead Molds 2½-3", 3½-4", 4½-5", either Straight Side or Quick Detachable made in one-fifth circle only. Outfit also equipped with self-contained source of steam supply, so that the purchase of separate boiler is not necessary.

The New-Type-F Equipment is now offered for $180, and is without question splendid value for the money. Regularly furnished with gas burner; gasoline or coal oil burner furnished at slight additional cost.

The Akron Rubber Mold & Machine Company manufacture a complete line of tire repair equipment covering various requirements of output and service at corresponding prices, and are also large makers of molds and tire builders' equipment.

Full particulars regarding the New-Type-F outfit or equipment for any requirements may be obtained by addressing the Akron Rubber Mold & Machine Company, 917 Sweitzer avenue, Akron, Ohio. This company issues a booklet,



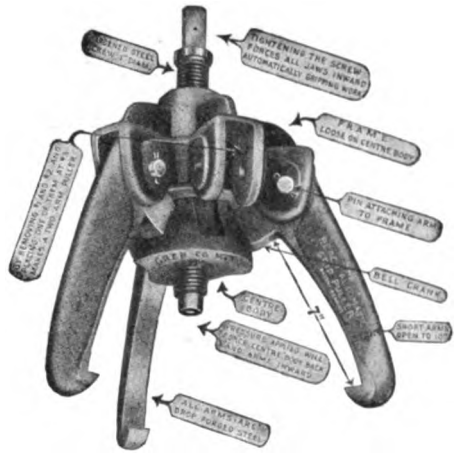
New Type F Vulcanizer Equipment.

"Tire Repairing, The Business of the Times," which should be of interest to anyone investigating the possibilities of the tire repair to-day, a copy of which will be sent on application.

Beach Automatic Grip Puller.

A good wheel or gear puller is as indispensable in a garage as a hammer. It may be used in a great many ways. It is practically the only tool with which a flywheel may be removed without the attendant danger of breaking the crankshaft.

The Beach Automatic Grip Puller,



Beach Automatic Grip Puller.

manufactured by The Greb Co., 197 State street, Boston, Mass., is built mechanically right, and when once the jaws are closed on the work and the screw is set against the shaft, it is impossible for them to unhook. Tightening the screw forces the jaws inward, automatically gripping the work, throwing pressure toward shaft or axle, making it more positive and requiring less pressure than the ordinary puller.

Positively removes wheels, gears, flanges, couplings, universal joints, wrist pins, and any number of other things. Quick, strong, durable, efficient and simple. It is complete with two sets of jaws; three 7½" jaws (open to ten inches), and three 12" jaws (open to eighteen inches).

Either a two or three jaw combination may be used, as there is an extra jaw socket directly opposite one of the other jaws. It is also made with a locking device by which the jaws may be set and locked in any position, which makes it a one-man puller.

Panvar Car Refinishing Liquid.

When an automobile is new, the owner takes great pride in the finish, but as time goes on he neglects more and more the care of the varnish, until finally his car begins to look old. All at once he may decide to have it refinished, but finds the cost too great, and is forced to let it remain in its shabby condition. For such owners, The Panvar Co., 608 Bulletin Bldg., Philadelphia, Pa., manufacture a refinishing liquid which is said to bring back all the luster of the original varnish. Panvar, as it is called, may be applied with a brush, but, unlike varnish, it does not harden immediately, but flows evenly, covering all brush marks. It is said that Panvar is weatherproof in all respects, and dries within eight hours.

The Plate Press.

Every battery repair shop must have some means of pressing plates, especially the negative plates. In "pressing" plates, transite boards of the proper thickness are placed in each space between successive plates, with two boards on the outside of the end plates. The group of plates is then put under pressure, either to strengthen the plates or to force the active materials back into the grid, flush with the surfaces of the grids. A large majority of negative plates require such pressing, as the most common fault with negative plates is the bulging out of the active material, thus causing a poor contact with the grids and consequently resulting in a loss of battery capacity.

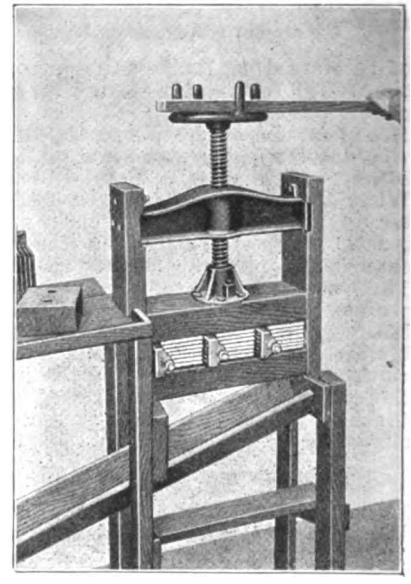
Never put negative plates into service if the active material is bulged. Such plates will never give good service, and will cause the battery to be sluggish. Always press the active materials of such plates back into place. This will give the battery its approximate normal capacity, and will lengthen its life.

Many garagemen press battery plates in an ordinary bench vise. This is hard on the vise, as acid drops from the plates on the iron parts of the vise, which in time become badly corroded and rusted. Such a vise is weak, breaks easily, and grows very stiff and hard to operate. The vise is therefore not well suited for this work because it is made of metal.

The AMBU Battery Plate Press, as illustrated, is specially designed for pressing battery plates and is so constructed that there is no metallic part which can be reached by acid dropping from the plate. A trough is so arranged that the acid which is squeezed from the plates is carried off into a drain, and there is consequently no rotting of the floor beneath the press by dripping acid, and no wet, acid covered floor to ruin your shoes and clothes.

A further advantage of the AMBU Battery Plate Press is that there are no iron parts near the plates from which bits of iron may fall on the plates. Iron is one of the greatest enemies of storage battery plates, as it ruins them in a short time.

Three groups of plates may be pressed at once in the AMBU Battery Plate Press, thus resulting in a considerable saving of time. The illustration shows



The Plate Press in Use.

clearly the construction of this press, and complete presses may be purchased from the American Bureau of Engineering, Inc., 1018-24 So. Wabash avenue, Chicago, Illinois.

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"Have used
set of Cork Insert Transmission Linings on my Ford for

10,000 miles

and they are

good as new"

—so writes Edward P. Schafer of Millvale, Pa., and his is a typical Ford owner experience with Cork Insert Transmission Linings. Outwearing two to three sets of ordinary linings, they end the nuisance and expense of frequent replacements. Throughout their long wear they give wonderfully efficient service. They stop the grab, slip and chatter — replace it with velvety smooth transmission action. They eliminate the heavy vibration and strain on mechanism and the Ford rear end. They make the Ford brake *brake*. They require less pressure on the pedal. They permit the hauling of a heavier load. Service considered, Cork Inserts are by far the most economical linings you can buy. Your dealer has them or can easily get them for you.

Dealers: Cork Insert Transmission Linings and Fan Belts give you a line of *good profits* in place of a small margin staple. Sales have jumped ahead every month the past year. Order Cork Inserts from your jobber and cash in on this winner.

Advance Automobile Accessories Corporation
Dept. C5-1 56 East Randolph Street
Chicago, Ill.



A fast selling non-slip fan belt for Fords

$1 for
1917 models
85c for preceding models

$3 per set of 3

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Tire Announcement.

The Jandorf Auto Company, 1769 Broadway, N. Y., announce that they have a large stock of standard make tires on hand which they are selling with big discounts. Bona fide dealers are requested to send for their list of prices and discounts.

Peck's Super-Heat Manifold.

To meet the demand for fuel service and gasoline economy Peck's Super-Heat Co., of 640 Middlebury street, Elkhart, Indiana, manufacture a manifold for Ford cars which consists of a dual manifold casting. Cast integrally with the intake manifold is a large exhaust passage which is designed to transmit the heat from exhausted gas to the ingoing vapor. This system is said to result in perfect gasification of the fuel, thereby reducing carbon and prolonging the life of the engine.

The manufacturers also claim greater flexibility for the engine when the device is used. The installation of this device calls for no changes in the engine beyond the removal of the present manifolds.

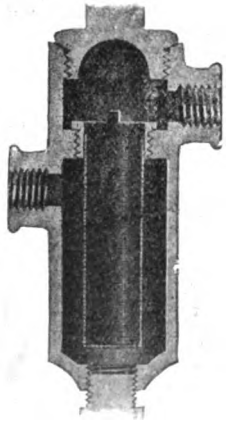


Peck's Super-Heat Manifold.

Sasco Strainer.

Many carburetor troubles may be traced to foreign substances in the gasoline. Dirt, dust and water, despite all precautions, sometimes find their way into the fuel tank, and to prevent the substances from going through into the carburetor the Sasco Strainer has been designed. This product is manufactured by Sage Bros., Inc., 780 Union street, Brooklyn, N. Y., and consists of an aluminum casting in which is fitted a fine mesh basket. The lower chamber of the body is connected with the fuel line while the upper part is connected to the carburetor.

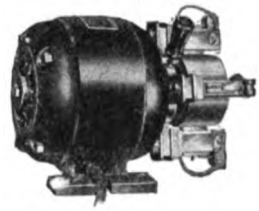
To pass from one connection to the other, the gasoline filters through the mesh basket, which has a very large surface. The basket can be removed for cleaning and replaced in a very short time. Both chambers are fitted with removable caps for cleaning.



Sasco Strainer.

Breco Converters.

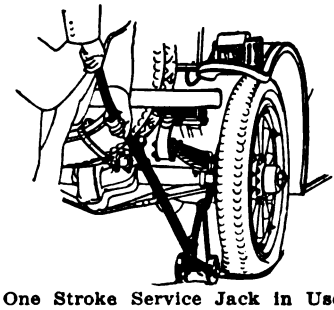
Perhaps no field related to the automobile industry is growing faster than that of the storage battery recharging stations. No matter whether a car is fitted with a generator or not, if it has a storage battery, the battery should be charged frequently from an outside source. The Breco Electric Co., 206 Huron street, Toledo, Ohio, manufacture a big line of alternating current rectifying devices in all sizes and designed for charging from one battery up. Individuals owning cars, as well as the large garage owner, who does a big battery recharging business, should investigate this line and write for catalogue.



One Type of Breco Converter.

Gemco One Stroke Service Jack.

"Quick service" is the motto of to-day and upon that principle the Gemco one stroke service jack has been designed. This device is made by the Gemco Mfg. Co., 742 South Pierce street, Milwaukee, Wis., and is designed in such a way that downward pressure upon the long handle gives sufficient leverage to lift practically any car from the ground. For different heights, a handle adjustment is provided. The whole device is strongly and substantially made and mounted on two wheels. The accompanying illustration gives an idea as to the utility of the device.



One Stroke Service Jack in Use.

The Hotel Winton.

What is described as the newest and finest hotel in Cleveland was opened December 20, 1917. We refer to the Hotel Winton, which is centrally located at Prospect avenue and Ninth street and has every conceivable modern convenience. No doubt a great many of our readers will be glad, when stopping in Cleveland, to look up the Winton and engage rooms there.

The Aero-Starter.

Mr. W. G. Farnsworth, formerly Secretary and Treasurer of the Dearborn Motor Truck Co., has recently taken a position of Vice-President of the Newstarter Mfg. Co., 1901 S. Western avenue, Chicago, Ill. This company manufacture a new and novel device known as the Aero Starter and Tire Inflator and designed for Ford cars. The complete outfit consists of a starting motor, an air compressor and a storage tank. The starting motor is a powerful four-cylinder, ball-bearing air engine, which is used only at the time of starting and takes compressed air from the storage tank. The compressor is of the automatic type and driven by a chain from the camshaft. It maintains a pressure of 200 pounds in the storage tank and operates only when the pressure drops below that figure. The manufacturers claim that the time required for installation is from two to four hours and that no alterations in the present Ford design are necessary.

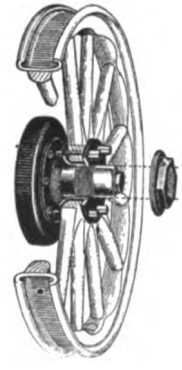
Tell-Tale Piston Ring.

Something new in the piston ring field is introduced by the Vulcan Machine & Tool Co., of St. Louis, under the name Tell-Tale. This ring is of the step-cut pattern, individually cast and made of the best quality iron. The patented feature of this ring is the unique arrangement of oil groove or channel with vents on the wearing surface. The manufacturers claim that such is the design that oil is distributed to every section of the cylinder walls. Another important feature is the turned wearing surface which soon wears in conformity with the cylinder shape



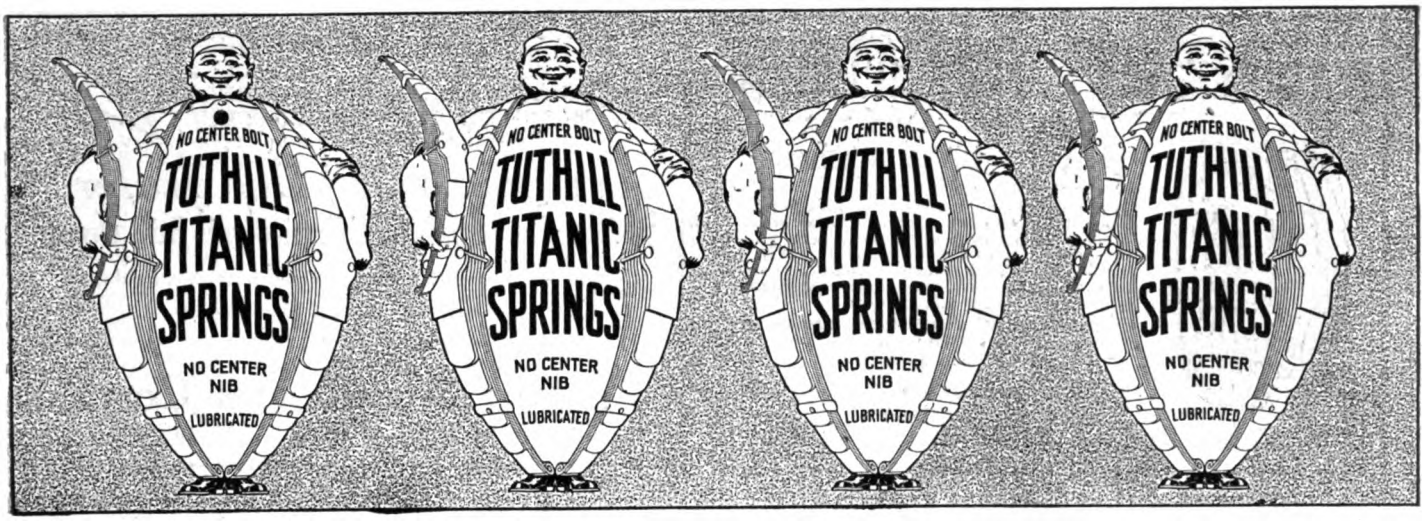
The Minute Demountable Wheel.

Changing tires on the road is at best a tiresome job and few motorists care for this sort of work. This is the reason for demountable wheels or rims with which most of the high priced cars are equipped. The Ford car is one of the few not fitted with such a convenience and to meet the popular demand the Hill-Smith Metal Goods Co. of Boston, Mass., manufacture a hub device, with which the Ford car wheel equipment can be made into those of the demountable type. A set of minute wheels consists of four main hubs which fit the Ford axles, together with all the auxiliary parts for five wheels, an extra wheel and the Minute wrench. The regular Ford wheels are retained. The time required for making a tire change is short; one has only to jack up the car, pull out the locking slide on the minute hub, place the wrench on the large nut, holding the wheel and spin the wheel, which may then be removed. The new wheel with fully inflated tire is put in place of the old, and the process reversed.



Application of Minute Demountable Wheel.

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ATLANTA—Elyea-Austell Co.
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Balt. Hub-Wheel & Mfg. Co.
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Carolinas Auto Supply House
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CLEVELAND—Gray Brothers
COLUMBUS—Griswald-Sohl Co.
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Tuthill Spring Product Co.
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Sherwood Hall Co.
HARTFORD—Post & Lester Co.
HOUSTON
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W. J. Holliday & Co.
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American Supply Co.
KANSAS CITY—Faeth Iron Co.
—Motor & Machinist Supply Co.
LINCOLN
Nebraska Buick Auto Co.

ON GUARD!

Tuthill Titanic Springs insure motorists both safety and economy. No weakening center bolt holes or center nibs here. The patented arch makes them *break-proof* at the center—where 3 out of 4 breaks occur.

TUTHILL TITANIC SPRINGS
LUBRICATED

—guaranteed forever against center breakage. More spring replacements made with Tuthill Titanics than all other makes combined. Replacements with these quality springs mean customer's good will and future business.

This Army of Picked Distributors at Your Service.

Representative stocks are carried at 60 selected centers with a factory reserve of 65,000. Every distributor is equipped to give prompt, intelligent service on spring replacement orders.

Send to nearest distributor for 1918 complete price list.

TUTHILL SPRING CO.

(Established 1880)

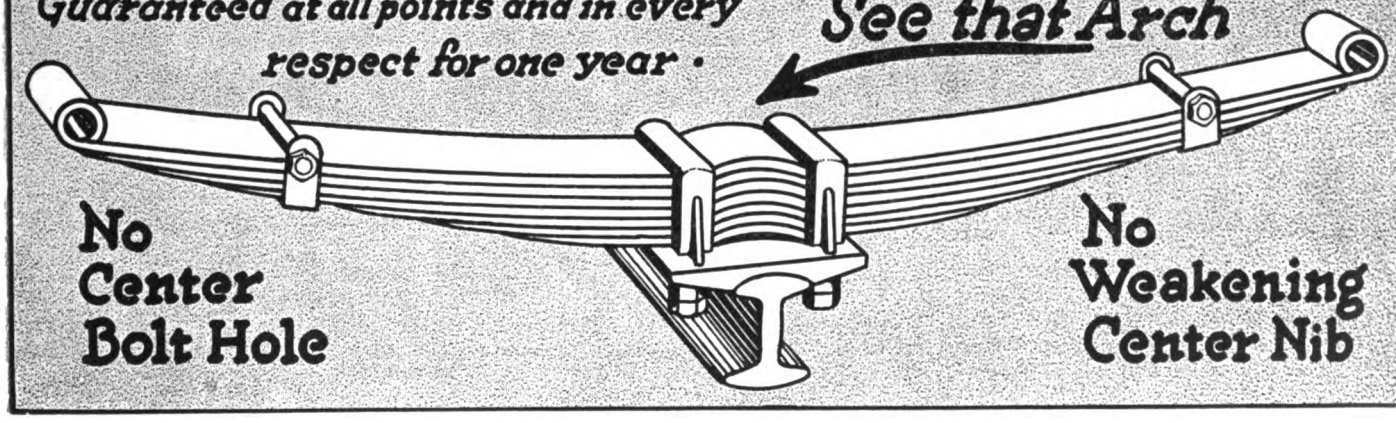
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WASHINGTON
Charles Rnbel & Co.
WICHITA
Shattuck-George Iron Co.

Guaranteed Forever Against Center Breakage!

Guaranteed at all points and in every respect for one year.

See that Arch

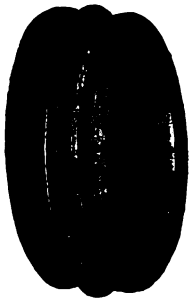


No Center Bolt Hole

No Weakening Center Nib

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STOP REAR AXLE TROUBLES



BY INSTALLING THE

BAILEY BALL THRUST

The bearing that replaces flat thrust washers at gear side of Ford and Chevrolet 490 differential, the common cause of all axle breakdowns. The Bailey keeps drive and pinion gears in proper mesh, makes them run smoothly and last indefinitely. Prevents axle trouble. Has six times the maximum thrust and is guaranteed to "stand up" under all conditions.

See your dealer today and forestall expense and axle repairs for 1918.

Price, $3.75

DEALERS: Write your jobbers—be prepared.

GEO. D. BAILEY CO., 1118 S. Michigan Ave., CHICAGO, ILL.

MACO
MOTOR ACCESSORIES CORPORATION

Are you a MACO dealer?

If Not, Perhaps Your Territory is Still Open.

Write for full information telling how our Exclusive Dealers are Making More Money.

WRITE TODAY.

Motor Accessories Corp.

170 Broadway, New York, N. Y.

Perry Auto Lock.

Locking the car to prevent it from being stolen is a big problem to-day, for motor thieves are daily improving in their methods.

The Perry Auto Lock, manufactured by the Perry Auto Lock Co., Department A, 2210-14 Michigan avenue, Chicago, is an ingenious arrangement which can be attached to the steering wheel of practically any automobile.

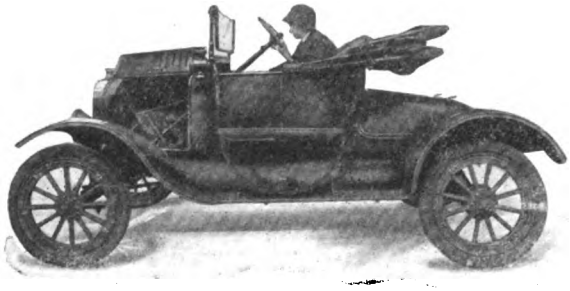
With the device in use, the machine may be locked so that the steering wheel is entirely disengaged from the rest of the mechanism and rotates independently. A turn of the key allows the wheel to drop back into place so that the car may be guided by the operator.

Du Pont Announcement.

Perhaps the largest publicity and advertising campaign ever carried on will be started by the Du Pont Sales Promotion Division, Dupont, Wilmington, Del. The purpose of this is to find jobbers and dealers throughout the country prepared to handle the Du Pont line. Anyone interested in this should correspond with the sales division.

Pres-Toe Starter.

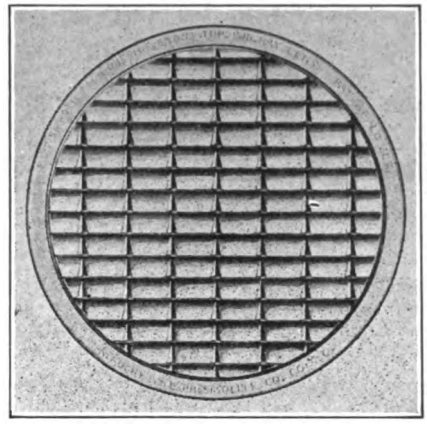
The new Pres-Toe starting device, made by the W. Robertson Machine & Foundry Co., of Buffalo, N. Y., is said to be greatly improved in design, over the one put out last year. The latest model is made with a compound leverage which is said to increase the power application more than 100 per cent. over an equal amount applied at the hand crank. The device is operated from the seat, and the manufacturers claim there is absolutely no chance of a "back-kick" injuring the operator. In connection with the starting device is a butterfly valve, which is operated automatically and makes engine starting easy. With the Pres-Toe installed, the hand crank is still available for emergencies.



Illustrating the Pres-Toe Starter.

Sun Ray Lens.

The headlight problem and proper light diffusion is admittedly one of the biggest confronting the drivers of to-day. Engineers spent much time upon headlight lenses, and as a solution the Prismolite Company, of Columbus, Ohio, offer their product under the name of Sun Ray Lens. This device consists of a number of horizontal prisms designed to deflect the light from the headlight bulb parallel with the road surface at a distance to conform with various State laws and downward so as to give maximum illumination upon the road bed. A unique arrangement of triangular vertical prisms diffuse the light to the sides of the road, lighting the curbs and ditches and enabling the driver to pass other machines without blinding the average driver with a brilliant glare.



The Sun-Ray Lens.

Guaranteed Magneto Parts.

The Guaranteed Magneto Parts Co., of 1765 Broadway, N. Y., market a complete line of replacement parts for magnetos, coils, starters and generators of standard makes.

Automobile Painting System.

Now that spring is here, the motorist begins to think of "sprucing up" his car and giving it a coat of paint for the coming season. The F. O. Pierce Company of 12 West Broadway, New York City, market a painting outfit with which it is said the car owner can paint and varnish his machine in three days. Any one interested in this system should write the manufacturers for their descriptive booklet, which contains a sample list of colors.

New Halladay Bumpers.

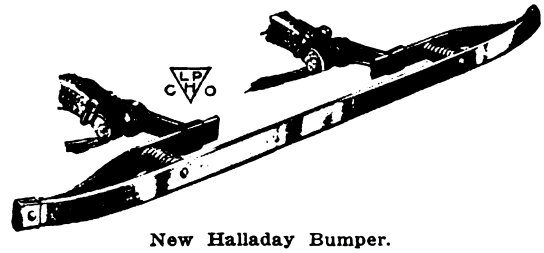
L. P. Halladay Company, Streator, Ill., offers a number of new bumper designs for the 1918 trade. The two that are attracting the most attention are the Multiple Spring Bar, and the Standardized Unit.

The Multiple Spring Bar is, as its name implies, a combination of the usual type of spring bar and two auxiliary buffer springs. The front member is a continuous spring bar made in two sizes, 2x⅜" and 1¾x5/16". Joined to this bar at ends by flexible connections are two inwardly extending spring members as the front bars. These form the supporting members and are secured to the various patterns of the Halladay support.

The Buffer springs are located between the outer and inner bars, with the result that on meeting an obstruction, no matter at what point of the bar the impact is received, the shock is distributed throughout the entire length of the bar, each part of the bar construction absorbing a part, and the least possible portion of the shock is transmitted to the car frame.

By making the rear or supporting members separate pieces and secured to the main bar by flexible connections, breakage at that point is eliminated.

Should, in the event of extremely violent accidents, any of the several pieces of the bar construction be broken, that particular piece can be quickly replaced at comparatively small cost.



New Halladay Bumper.

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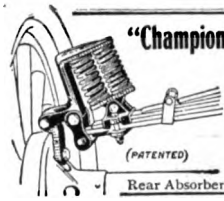
A Court Decision.

The United States District Court, Northern District of Ohio, Eastern Division, has sustained the validity of patent 1,215,904 on Brown spring oilers and has held the Diamond Spring Oiler Co. an infringer. The Brown spring oiler, as most of our readers know, is manufactured by the Brown Spring Oiler Co., of Cleveland, O.



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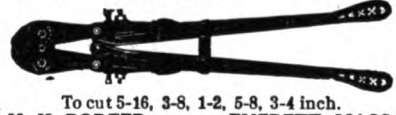


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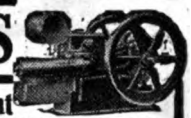
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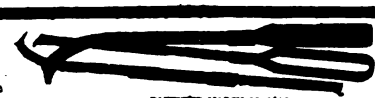
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34x3½	8.25	8.80	3.00
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Exceptional Values

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31x4	9.00	10.00	36x4½	11.00	12.00
32x4	9.00	10.00	37x4½	11.00	12.00
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34x4	10.00	11.00	36x5	12.00	13.00
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PATENTS PROCURED by a FORMER EXAMINING OFFICIAL Automobile Division U. S. Patent Office. NORMAN T. WHITAKER,
Attorney at Law and Mechanical Engineer
470 Whitaker Bldg. Washington, D. C.
Inquiries Invited

STARTLING PATENT FACTS.—Send postal for 1918 90-page book FREE. Your idea may mean a fortune if handled rightly. Learn how my service differs. Send sketch or model for actual search. George P. Kimmel, Patent Lawyer, 96-C Oriental Bldg., Washington, D. C.

IMPROVEMENTS WANTED.—Send for free bulletins and advice Book "INVENTIONS —PATENTING & PROMOTING" Free. Lancaster and Allwine, 212 Ouray Building, Washington, D. C.

Wanted

WANTED—Address of parties that manufacture a Bunsen burner for kerosene fuel at sixty pounds pressure. Maddox Foundry & Machine Co., Archer, Fla.

WANTED.—Second-hand Continental Engine. State price, condition and horsepower. P. S. Johnston, Livingston Manor, N. Y.

WANTED.—Parts for model O. O. White Steamer Automobile. Maddox Foundry & Machine Co., Archer, Florida.

Instruction

AUTOMOBILE INSTRUCTION—The West Side Y. M. C. A. Automobile School gives a practical course in shop and road practice in four or eight weeks, day or evening. Provision made for out of town men. 322 West 57th St., New York City.

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For Sale

PYRMA ALUMINUM HEEL PLATES cover or prevent unsightly holes in floor board coverings, 75 cents each. These plates and PYRMA ALUMINUM MATTING for sale by all up-to-date dealers. Metallic Automobile Matting Co., Rochester, N. Y.

FOR SALE—Various makes of 4, 6 and 8 cylinder Magnetos, headlights, sidelights and searchlights for automobiles which have been used for experimental work. Also several types of watthour meters which have been used for testing purposes. Write for particulars to P. O. Box 1027, Rochester, N.Y.

FOR SALE.—Gasoline tank and pump, retreading molds, upright coal burning boiler suitable for Vulcanizing plant, and cash register. Vanderpool Co., Springfield, O.

GARAGE FOR SALE.—Owner will build garage, 100x100, on corner Coney Island av., one block north of Church av., Brooklyn; very good location; easy terms. Levy Bros., 189 Montague St., Brooklyn.

FOR SALE—Switchboards for all purposes. Give us your exact requirements and we will send you original drawing and special price. Frost Engineering Company, Oak Park, Illinois.

FOR SALE—Make your own Gasoline Tonic, Carbon Remover and Celluloid Cement. Three guaranteed formulas 25c. No stamps. Western Sales Co., Herington, Kans.

Agent Wanted

AGENT WANTED—To represent English manufacturer in patent Motor-car Accessories. Apply H, Box 654, New York.

Patent For Sale

PATENT FOR SALE—$5,000 will purchase half interest in Motor Treadmill, power transmission from auto. To mill for woodcutting. Pumping water, cutting ensilage, and so forth. Price includes half interest in business now on hand, 60% of purchase price to go back into business. Demand unlimited, 100% gross profit. Griffin Mfg. Co., M. E., 113 State Street, Boston, Mass.

Personal

BROTHER—Accidentally discovered pleasant root, chewed like gum, quickly, easily, overcomes both tobacco habit and indigestion. Gladly send particulars. G. A. Stokes, Mohawk, Florida.

A Large Order.

A very large order in the accessory line was taken at the Boston Automobile Show by Mr. J. J. Kelleher, Sales Manager of the Stenman Electric Valve Grinder Co., of Worcester, Mass This was an order taken from the Linscott Auto Supply Co. of Boston for the well-known Stenman valve grinder. The amount represented was $17,500 and called for immediate delivery of the goods. The Linscott Auto Supply Co. reported that they had sold over their counter at the show more than 125 Stenman grinders. Perhaps the above facts are a sufficient attestation of the practical value of the Stenman electric valve grinder.

Firestone Seconds.

For those who desire a high quality cord tire but do not feel like purchasing a new product, Frank W. McAllister, 1761 Broadway, New York City, are offering Firestone Super Cord Tires at very interesting prices.

These tires are said to be only slightly blemished and are claimed to give their full original mileage. Other high-grade makes of seconds are also carried in stock.

Macbeth Lens.

The alarming increase in the number of automobile accidents caused by glaring headlights had definitely established the need for a device which will prevent direct glare, but at the same time furnish light enough for illumination. After four years of experimenting, the engineers of the Macbeth-Evans Glass Co., of Pittsburgh, Pa., produced a headlight lens which is claimed to be efficient as well as pleasing. This lens consists of five horizontal prisms, each of which is inclined at an angle determined with scientific accuracy. These prisms direct the light rays below the horizontal upon the road a distance ahead of the car. At the back of the lens a concave recess is provided which results in the deflection of light beams to the side of the car. A visor-like, green shade, extending from the top of the lens, prevents any stray beams from blinding an approaching driver.

New Spery Radiator.

In the Spery radiator, manufactured by the Hooven Radiator Company of Chicago, the makers contend that a great addition in radiator construction has been achieved.

A front view of this radiator would give one the impression that it was of the honeycomb type. The cross-section, however, shows it to be a combination of the honeycomb and tubular principles. The sections are made of zigzag stampings carefully fitted together and stoutly braced from top to bottom. Running vertically are a series of cores pressed into the zigzag sections. These cores not only act as water channels and prevent the clogging of the small sections, but also serve to strengthen the sections.

Johnson's Radiator Cement.

Frequently a radiator springs a leak at some point within, and to repair the break in the tube or section by the soldering method would mean considerable time. A method that is gaining favor among owners is the application of cement in the radiator liquid. A radiator



Radiator Repair Cement.

cement of this kind is manufactured by S. C. Johnson & Son, Racine, Wis., and is simply dissolved in the cooling water, the engine run for a few minutes until the leak is stopped, and the cement allowed to harden. The manufacturers claim a permanent repair can be made in this manner.

Carleton Generator.

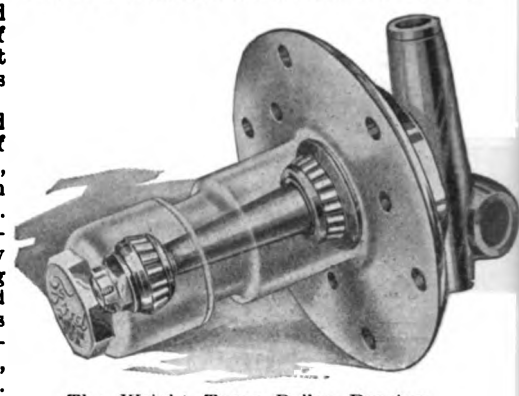
For those Ford drivers who are not satisfied with the Ford magneto as a source of lighting current, the Carleton Mfg. Co., 170 Summer street, Boston, Mass., manufacture a lighting outfit which has many interesting points.

The generator is designed to be applied to the left side of the Ford engine and is operated either by a special belt which also operates the Ford fan, or if desired by a special silent chain and sprocket arrangement. With the generator is furnished an automatic governor and cut-out which controls the current passing to the battery.

The system provides an independent lighting system which is comparable with lighting systems installed on high-grade machines. In addition to the Ford system, equipments are made by this company for Saxon and Metz cars and for motorcycles or motor boats.

Wright Taper Roller Bearings.

Many Ford owners do not care for the standard ball bearings furnished for the front wheel spindles, and to satisfy a demand, the National Bearings Service Co., of Philadelphia, Pa., manufacture a



The Wright Taper Roller Bearing.

special type of taper roller bearings which may be used to replace the present Ford bearings. The accompanying illustration clearly shows the construction and application of this device.

Tops and Body Equipment.

George W. Copp Co., Inc., of 351-355 West 52d street, New York City, and formerly known as the New York Auto Equipment Co., Inc., announce that they are prepared to supply automobile tops of all standard styles as well as upholstery, tire covers and seat fabrics. This firm also make a specialty of custom body work as well as painting, and are well known throughout the country for their excellent work.

Workrite Combination Outfit.

Absolute cleanliness is one of the essentials which makes for long storage battery life. Only by keeping the filler bulb and hydrometer away from the dust and dirt can cleanliness be preserved. The Workrite combination outfit, made by The Workrite Mfg. Co., of Cleveland, Ohio, is a combination hydrometer, battery filler, and water bottle. The battery filler, which contains the hydrometer, is fitted with a rubber filler tube and a large bulb, both the tube and the bulb being provided with large washers or flanges to prevent breakage, should the device be dropped upon the floor. The filler fits into the distilled water bottle, upon which is pasted full directions for storage battery upkeep. The filler and hydrometer may be purchased separately if desired.

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GARAGEMEN and REPAIRMEN!

Your Jobber Handles These Shop Tools

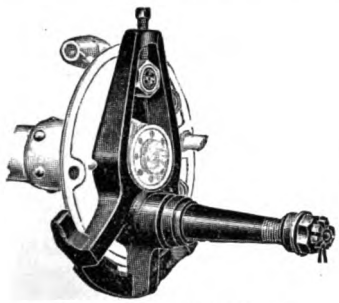
Every Up-to-Date Garage Should Have This Equipment—*Order Now.*

TRADE **EKERN** MARK

Indispensable to Garages and Machine Shops, Quick, Saves Time and Money.

You Need Them Badly **Then Insist on Getting Them**

EMERGENCY AXLE STUBS FOR FORD CARS AND OTHER CARS



Emergency Axle No. 1



Emergency Axle No. 2

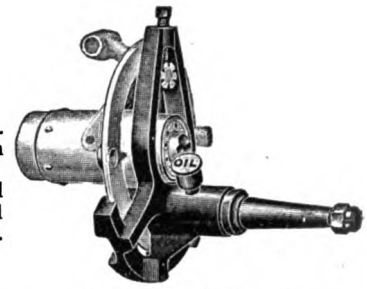
These devices are for bringing in cars with broken axles. With either type of axle, a car can be placed on its own wheels within a few minutes time.

The No. 1 and No. 2 axles require an extra front Ford wheel and cones, while the No. 3 uses the rear wheel and has a compression grease cup to prevent it from getting hot.

Nos. 1 and 3 are for Ford cars.

No. 2 is for all other makes of cars.

List Prices: No. 1, $5.00; No. 2, $10.00; No. 3, $6.00



Emergency Axle No. 3



Portable Work Bench

PORTABLE WORK BENCH & ENGINE STAND

It is provided with two large trays, 22x24, for convenience, where the workman can place his tools, motor, and axle parts. The stand is mounted on three 4-inch diameter wheels. The rear castor wheel is so constructed that by pulling the plunger jim, the castor will swing up off of the floor and the stand will then rest firmly on its legs. By kicking the castor lever down, the stand will go back on its wheels and lock automatically.

A Ford assembly can be fastened to the stand the same as with our Motor Stand.

The Work Bench is also equipped with a machinist's vise, which has a 3-inch jaw with a 4-inch opening, which will handle any work required in overhauling a Ford motor or axle, also other kinds of work.

The Work Bench & Engine Stand is 36 inches high, 27x42 inches floor space.

Weight, 120 lbs. **List Price, $40.00**

MOTOR STAND

The handiest device of its kind for use in shops and garages doing Ford engine work. The Ford motor when taken from a car can be fastened to the stand by the two cap screws which screw into the side of the motor where water inlet connection is fastened. The stand is so constructed that the part screwed to the motor will revolve in the clamp on the stand and can be locked by tightening the lock-screw which will hold the motor in any position or angle desired to suit workman. It also has a tool tray where the workman can place his wrenches or parts of the motor, if so desired. It is mounted on wheels so it can be moved from place to place. It is 34 inches high; 32x30 inches floor space.

Weight, 50 pounds.

List Price, $20.00



Motor Stand

AXLE ATTACHMENT



Axle Attachment

The attachment is for use on either our Portable Work Bench & Engine Stand or our Motor Stand.

By merely bolting this Attachment to the revolving part of the stands, it quickly converts them into axle repairing stands for repairing nearly all makes of automobile axles.

Weight, 9 pounds. **List Price, $6.00**



Axle Attachment

PORTABLE GARAGE GREASE GUNS



Model B Grease Gun

Consists of a heavy seamless steel cylinder mounted on wheels, has five feet of hose attached to bottom with shut-off valve and nozzle at end of hose. Register measures accurately the amount of grease put into axle housing or transmission case and will work equally as well on liquid oil as on hard grease.

The cylinder is 20 inches long by 6 inches in diameter; capacity, 20 lbs. of grease or 2½ gallons of oil. The piston is covered with best quality cup shaped leather and is provided with an expansion ring in piston which eliminates grease and oil from leaking by the piston. The piston also has an automatic air vent to release the vacuum in the cylinder when cranking the piston up for refilling. The base is provided with a locking device which lifts the castors up from the floor when cranking.

TO OPERATE: Turn crank until piston comes out of cylinder, the head and piston can then be turned to one side and the cylinder filled with grease; set register by pressing indicator rod down to zero and turn crank until you get the amount of grease desired; register will show the exact amount of grease put into the gear case, the register can be reset any time desired by pressing indicator rod down to zero. The same indicator is used for grease and liquid oil. When grease is used it indicates pounds, and for liquid oil it indicates pints.

Models B and K provided with a set of quick return gears and can be refilled in one minute. Weigh-, 95 lbs.

List Price, each, $47.50

Model A is not equipped with return gears. Can be refilled in one minute. Weight, 90 lbs.

List Price, $45.00

PRICES F. O. B. CHICAGO *DISCOUNTS TO DEALERS*

H. G. Paro

Department J

1410-12-14 South Michigan Boulevard

CHICAGO, ILL.



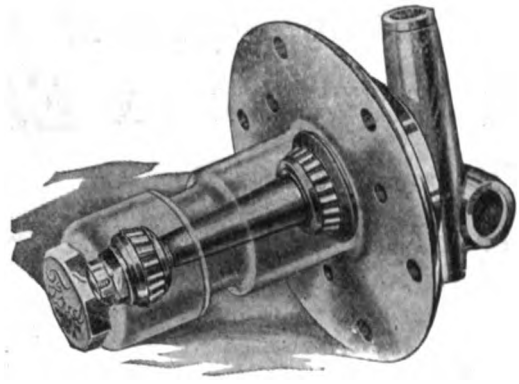
Open for Refilling

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The chances are 4 to 1 that the bearings in your Ford front axle won't last 12 months. Why not anticipate the troubles bound to come through poor alignment and install Wright Taper Roller Bearings to prevent these troubles?

These unique roller bearings are identical in design with those used on the highest grade passenger and commercial vehicles. They'll outlast your Ford and will absolutely prevent misalignment of the front wheels and excessive tire wear. The use of demountable rims crushes the present Ford bearing. Wright Taper Roller bearings will carry this additional load.
There's no difficulty in installing them as they fit the Ford without any changes whatever.

Price, $10.00 per set
(4 Bearings)
In Canada, $15.00



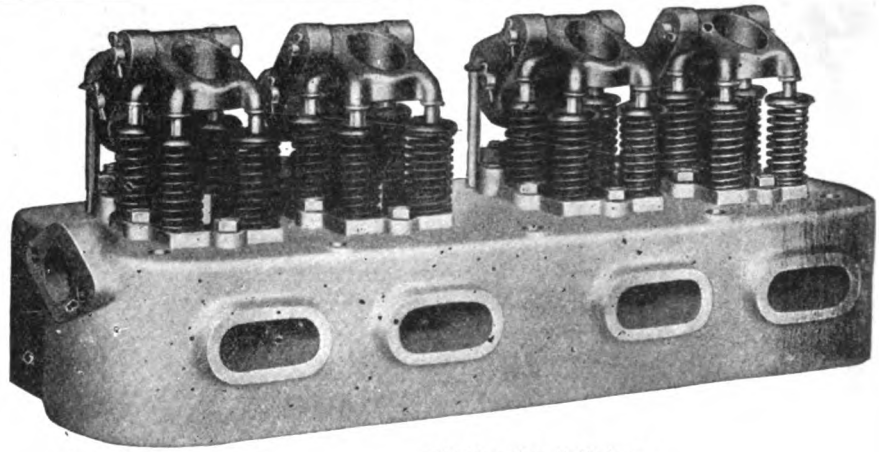
Wright Taper Roller Bearings Installed on Ford Front Spindle.

Dealers, write Dept. A for proposition and details.

NATIONAL BEARINGS SERVICE CO.
WRIGHT TAPER ROLLER BEARINGS
Replacements for all Standard types of Bearings

727 N. Broad Street **Philadelphia**

Make Your Ford a $3,000 Car from the Standpoint of Motor Service



Price $95

16 Overhead Valves for Fords

SPEED POWER ECONOMY

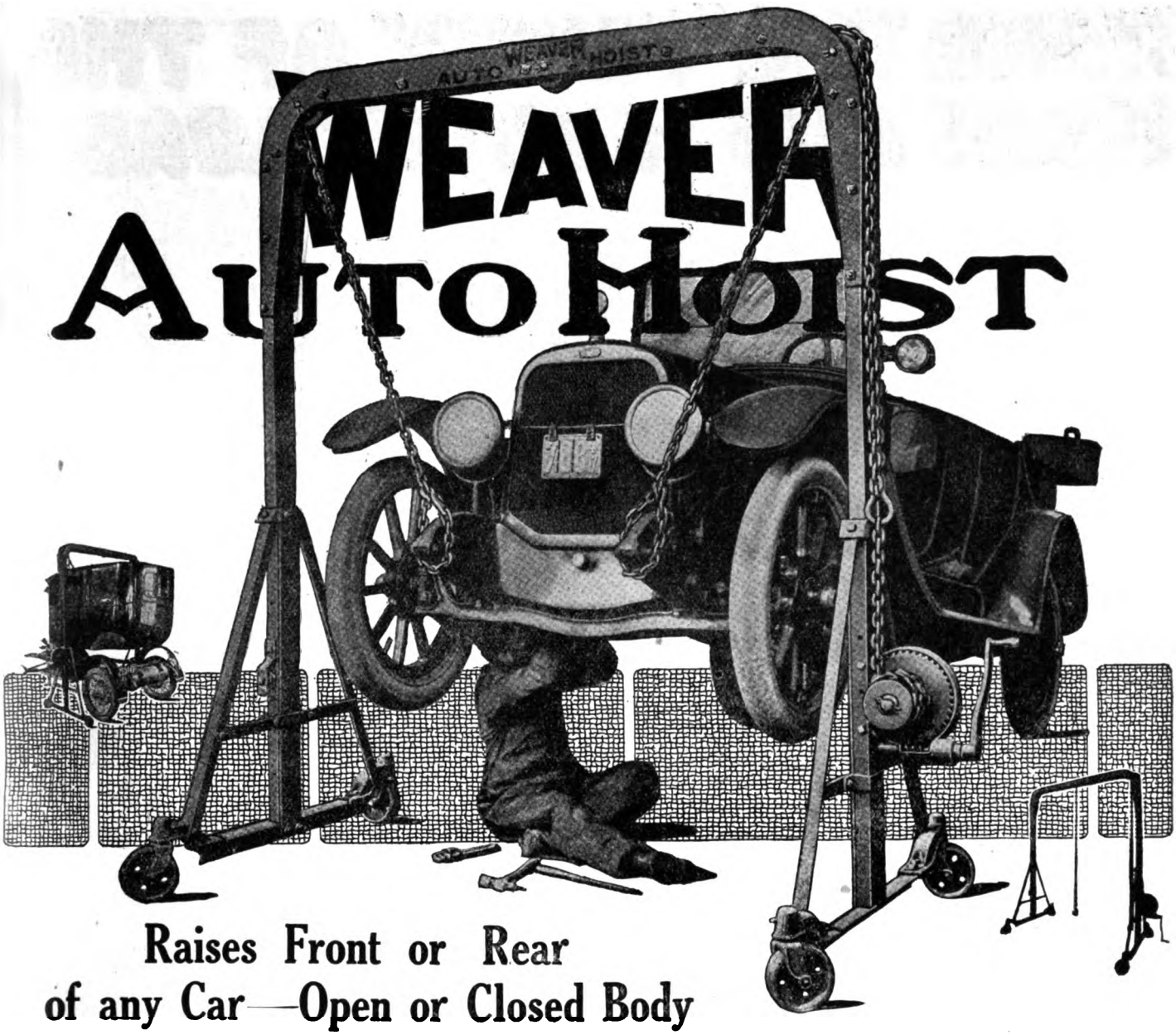
Speed to climb the steepest hills as you never dreamed of before. Power to double the value of your converted Ford truck, the load carrying capacity of which is only limited to the strength of the rear axle. Speed for the road or for the track to rival the high cost racing cars. A long list of racing car drivers, winners of speed contests, show what you can look for if you want a snappy speedster or a race track winner.
Special equipment for touring car, truck and racing car for $95.00. Extra racing equipment at special low prices. Get our quotations on high speed cam shaft, gray iron pistons, aluminite connecting rods, Lynite pistons and rings complete, counterbalances for crank shaft, nickel steel racing gears 3 to 1 ratio, special oiling systems, fast carburetors and beautifully designed racing bodies. Every Ford owner a likely prospect and every Ford converted truck owner a sure sale. An absolute necessity to every owner of a fast Ford.

DEALERS: Get our distributing terms and quotations on the greatest selling specialty in America. Write today.

LAUREL MOTORS CORPORATION, ANDERSON, INDIANA
Made in the "Puncture Proof" City

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WEAVER Auto Hoist



Raises Front or Rear of any Car—Open or Closed Body

Any car,—in any location in your garage,—
can be *quickly* and *safely* elevated.

THE Weaver Auto Hoist can be run astride of the desired car no matter where that car may be located in your garage. Isn't necessary to move three or four other cars in order that the one may be gotten out and into position under a block and tackle or some similar lifting device which can be used only in certain locations.

You only need fourteen inches space on either side of the car to permit this Hoist to be rolled into position over it.



SAFETY

The lifting mechanism is operated by WORM DRIVE;—no treacherous ratchets to slip or break.

The chains are heavy and are each tested INDIVIDUALLY far in excess of their required strength.

The bases are made very broad in order to prevent the Hoist turning over under any circumstances.

TELESCOPING FRAME

The height of the frame may be increased one foot by means of its own lifting mechanism. This is often a great convenience in raising the rear of a closed car.

SINGLE OR DOUBLE CHAIN

When so desired, the burden can be handled by a single suspension as shown in the small cut in the lower right hand corner. This is done by simply dropping the chain over the center roller.

CONSTRUCTION

Frame of heavy five inch channel steel; large ball and roller bearing casters; lifting leverage, 500 to 1; capacity, 3,000 lbs.; height, 8 to 9 ft.

WEAVER MANUFACTURING CO.,

THE WEAVER TIRE SPREADER will spread any casing for inspection and hold it open for buffing.

2171-79 S. 9th Street, SPRINGFIELD, ILLINOIS.

WRITE FOR CATALOG of our complete line of **Garage Equipment.**

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STAND THE "POUND" OF THE ROADS AND HEAVIEST LOADS



SEVEREST "hardships" of travel can't hammer down the resistance of Higgins Springs—lessen their resiliency or batter a way for breakage.

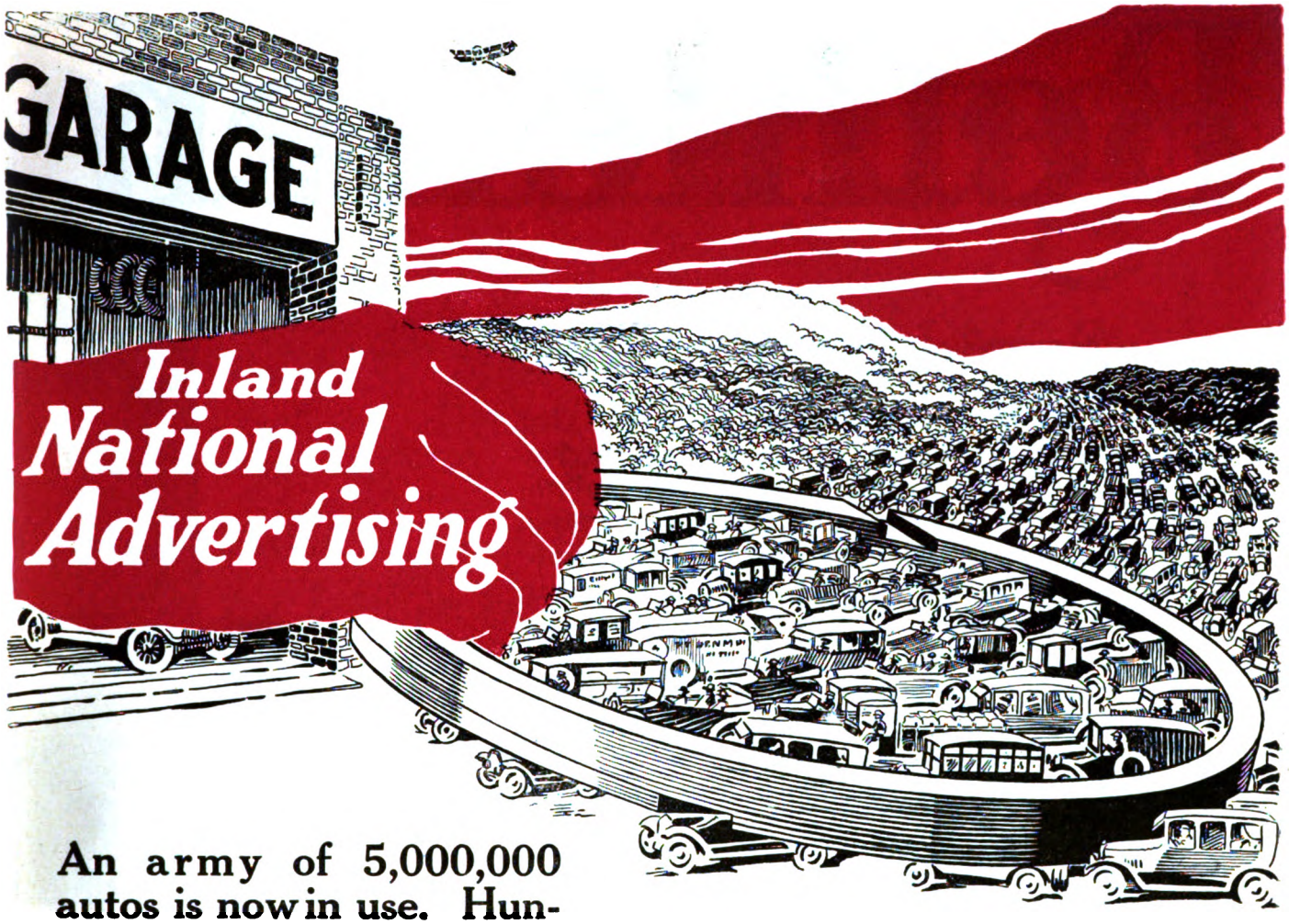
DEALERS—To develop spring trade to the last dollar of profit to *you* and greatest satisfaction to *your trade*, you *need* Higgins Quality and sales helps. Catalog listing 500 different styles — discounts — entire proposition on request. Send now.

Higgins Spring & Axle Co.
Racine, Wisconsin
Dept. 314

NO BOLT
NO HOLE
NO HUMP
NO JOLT

HIGGINS
QUALITY SPRINGS
FOR REPLACEMENT

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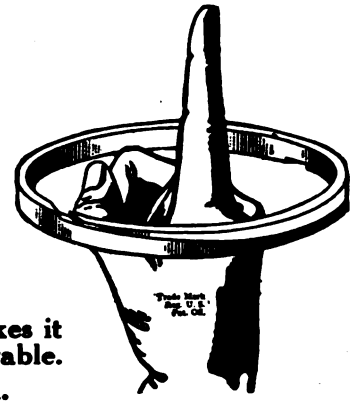
An army of 5,000,000 autos is now in use. Hundreds of thousands of them *need* new piston rings. With our big, smashing page and half page ads in

The Saturday Evening Post
Literary Digest Collier's

we are making these millions of motorists realize the *necessity* and *economy* of installing gas-tight piston rings—and emphasizing the special advantages of Inlands.

Now it's up to you. A big over-hauling business is ready for you—if you'll link up your garage with Inlands and Inland advertising. To help you do this, we've prepared *complete material for your local use* that will *bring* you the over-hauling business of your vicinity. We supply this *free*. Thousands of live garage dealers are working with us and reaping the benefit in bigger business. How about *you*—write us to-day.

INLAND
1 PIECE PISTON RING



The Spiral Cut makes it absolutely gas-tight. One-piece construction makes it low-priced. Equal width and thickness make it strongest and most durable.

Inland Machine Works, 802 Mound Street, St. Louis, U. S. A.

Please mention the Automobile Dealer and Repairer when writing to advertisers.

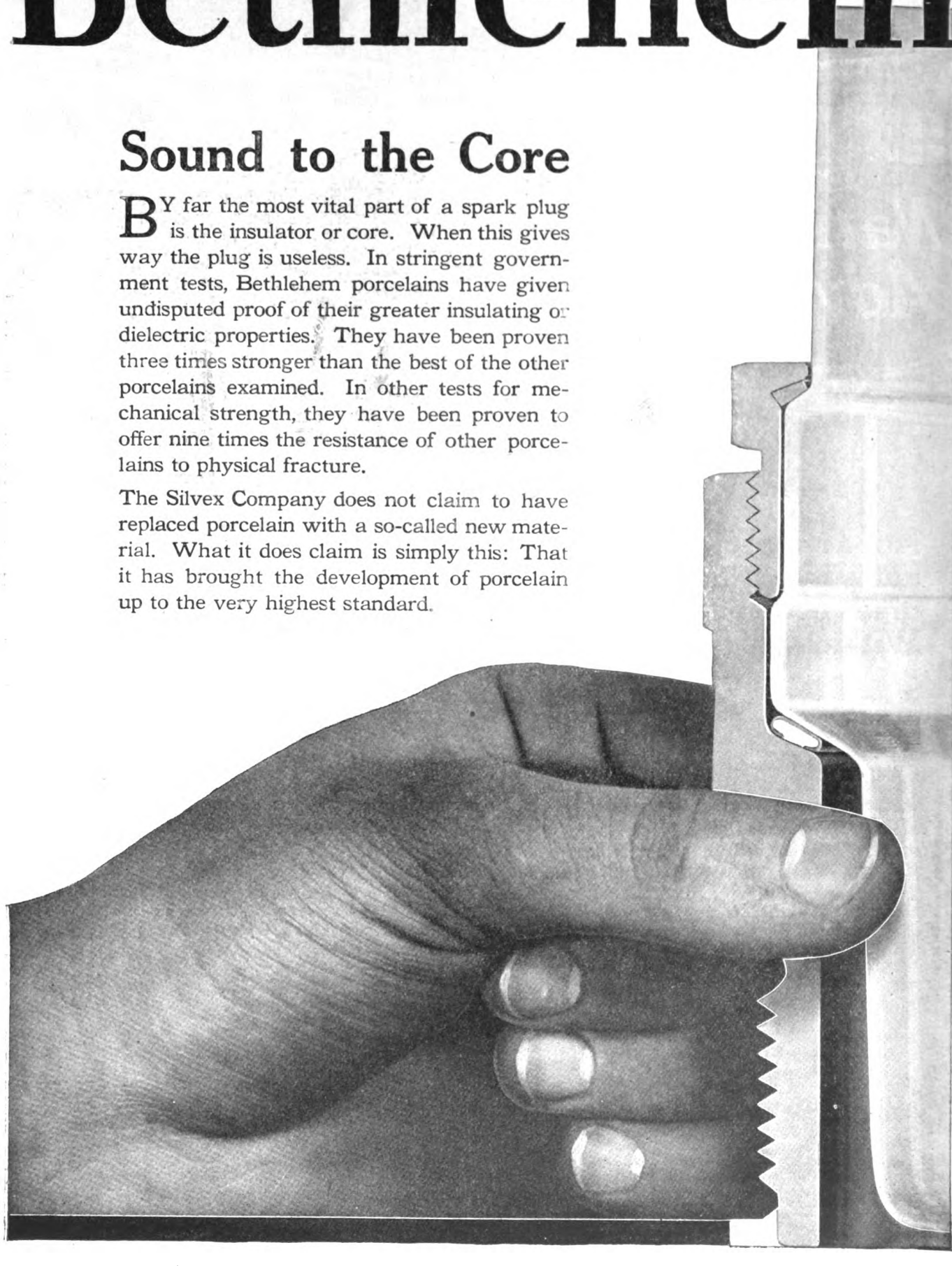
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Bethlehem

Sound to the Core

BY far the most vital part of a spark plug is the insulator or core. When this gives way the plug is useless. In stringent government tests, Bethlehem porcelains have given undisputed proof of their greater insulating or dielectric properties. They have been proven three times stronger than the best of the other porcelains examined. In other tests for mechanical strength, they have been proven to offer nine times the resistance of other porcelains to physical fracture.

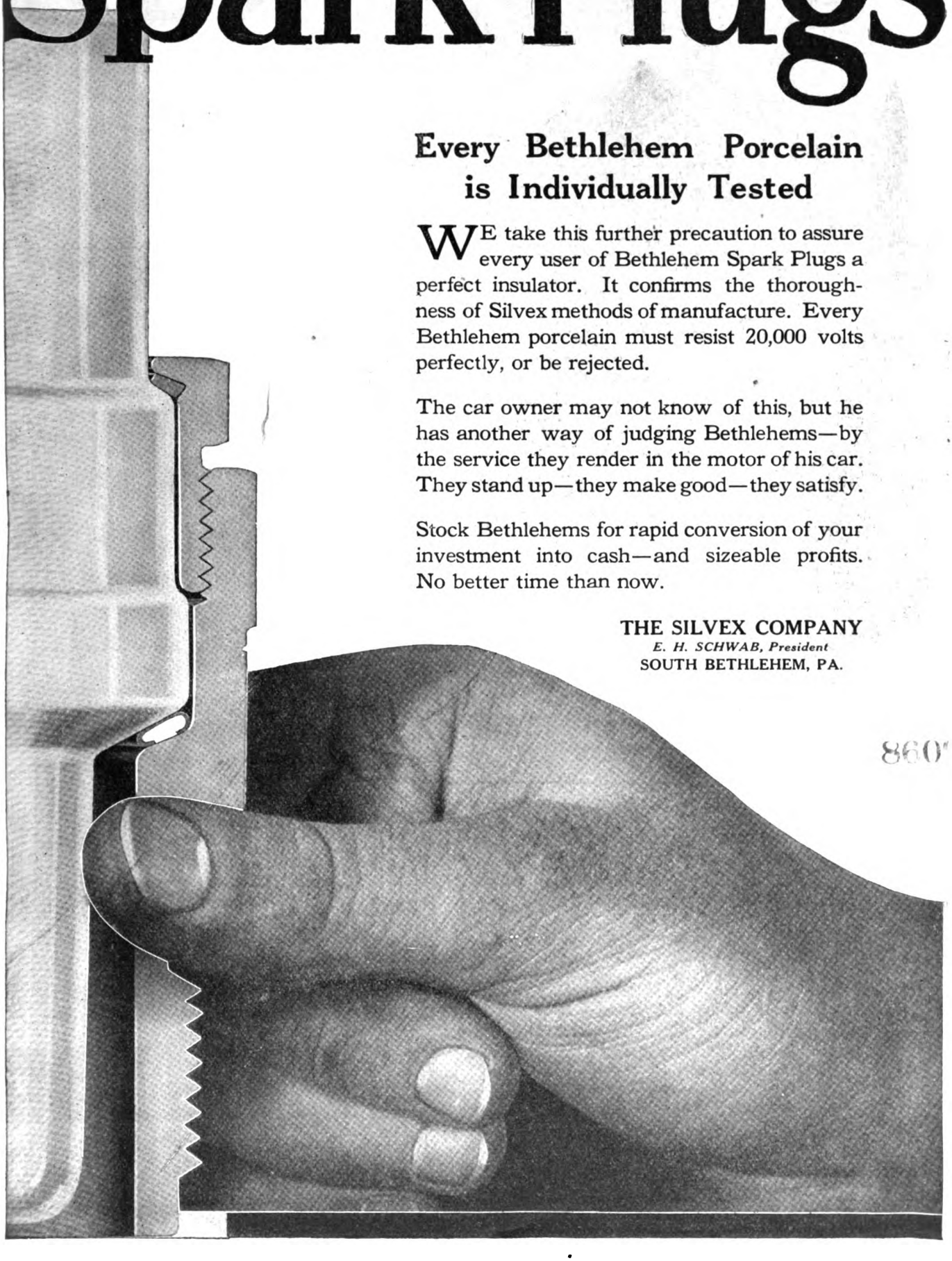
The Silvex Company does not claim to have replaced porcelain with a so-called new material. What it does claim is simply this: That it has brought the development of porcelain up to the very highest standard.



Please mention the Automobile Dealer and Repairer when writing to advertisers.

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Spark Plugs



Every Bethlehem Porcelain is Individually Tested

WE take this further precaution to assure every user of Bethlehem Spark Plugs a perfect insulator. It confirms the thoroughness of Silvex methods of manufacture. Every Bethlehem porcelain must resist 20,000 volts perfectly, or be rejected.

The car owner may not know of this, but he has another way of judging Bethlehems—by the service they render in the motor of his car. They stand up—they make good—they satisfy.

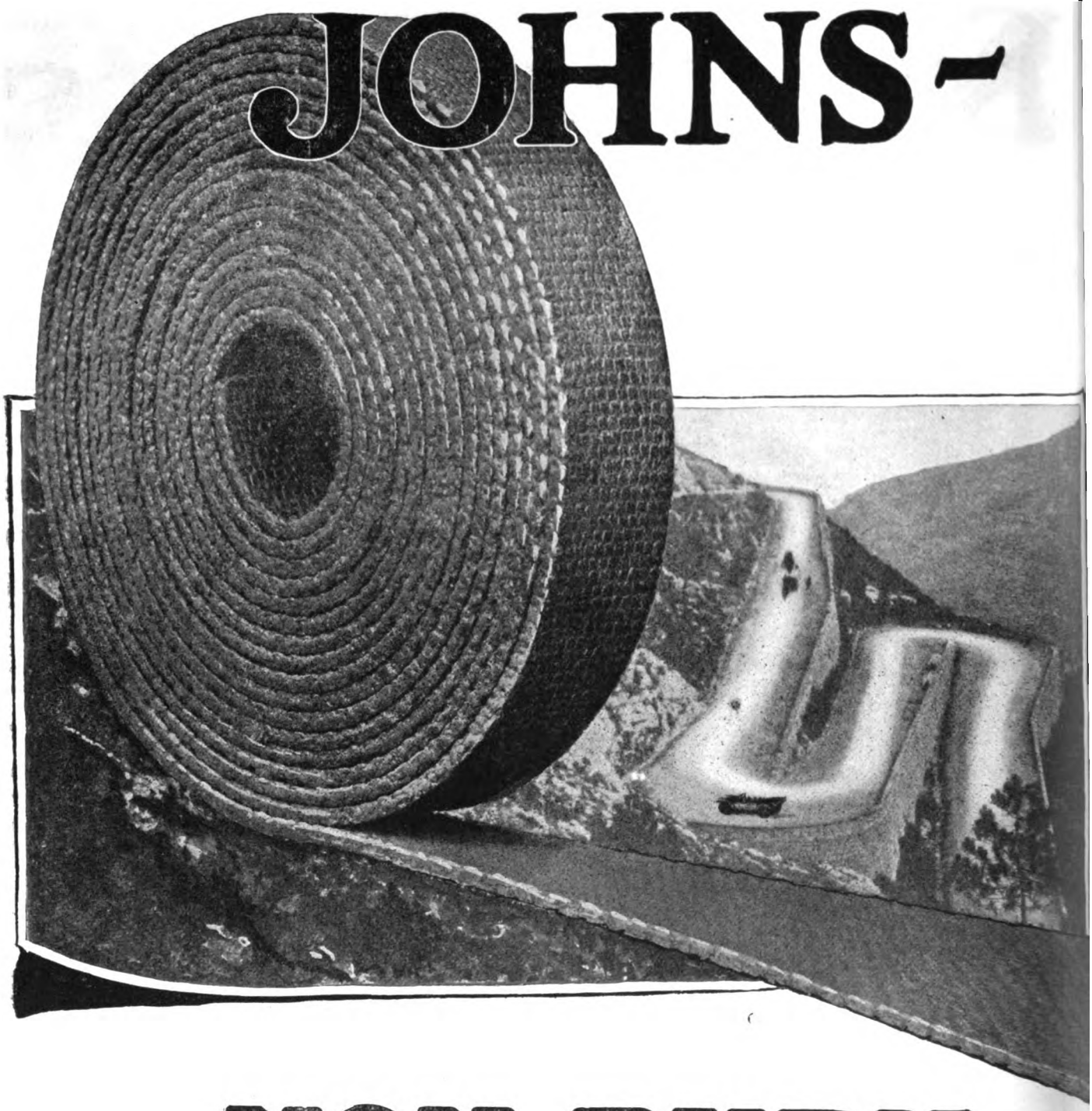
Stock Bethlehems for rapid conversion of your investment into cash—and sizeable profits. No better time than now.

THE SILVEX COMPANY
E. H. SCHWAB, President
SOUTH BETHLEHEM, PA.

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JOHNS-



NON-BURN
ASBESTOS
BRAKE LINING

Please mention the Automobile Dealer and Repairer when writir ; to advertisers.

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MANVILLE

Brake lining like this is a repair man's good-will builder.

People bring their cars into your shop the first time because they are in trouble. And they come back or they don't, depending on the impression they get of you and your service. As a rule your customers are not mechanics—they can't inspect and recognize a good mechanical job—but they expect a job to last. And it is just like that when you reline brakes.

Perhaps you can put over *any* lining, but you don't want to because it is not good business. Non-Burn on a customer's bill flashes quality to him and he thinks a lot more of you as a service man because he knows about Johns-Manville and asbestos. He has read the asbestos pedigree of Non-Burn in hundreds of advertising stories and you capitalize on all this good-will when you sell this lining.

Now go a step farther—not only install Non-Burn but sell it by talking it—because there is a good profit in it. Perhaps it is natural that NON-BURN quality should be reflected in the policy under which it is sold—the fairest and most liberal sales plan we could devise. NON-BURN is distributed strictly through regular jobber-dealer channels. Discounts are generous, rigidly maintained and uniform, regardless of quantity—permitting rapid turn-overs and protecting your profits. Details on application

H. W. JOHNS-MANVILLE CO.
NEW YORK CITY.
10 Factories—Branches in 61 large Cities.



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H-S

"MINUTE" DEMOUNTABLE WHEEL FOR FORD CARS



Licensed under patents of Wire Wheel Corp. of America.

"One Nut To Unscrew That's All You Do"

THE QUICKEST TIRE CHANGE IN THE WORLD

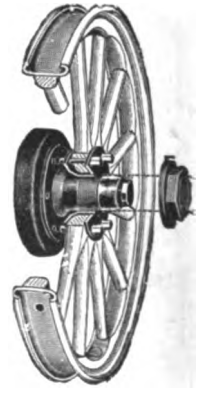
Who says it can't be done?—let some grouchy doubting Thomas who is sure "it can't be done" remove the large nut with the powerful Minute Wrench and make the change himself in a minute. This simple stunt never fails to convince.

Install a set on your own Ford and watch the interest created by the Minute Hubs.

Minute Wheels Are Easy To Install They Are Also Easy To Sell

H-S Minute Wheels are as great an improvement over demountable rims as demountables were an advance over the clincher rims of former days.

With this time-saving device, Ford owners can change tires in sixty seconds. Therefore, why waste fifteen to twenty minutes on a tire change?



Your Ford customers will welcome a chance to escape the drudgery and inconvenience of tire changing, especially during the rainy season of March and April.

It will pay you a substantial dividend to take advantage of our special direct-by-mail advertising proposition which we offer to dealers placing an initial order for four sets of Minute Wheels. We send a series of illustrated letters to your customers on your letter head at our expense. Send for complete story.

We can help you build up a profitable business on Minute Wheels if you are ready and willing to do your part.

First, send for literature—it is important.

HIGHEST QUALITY H-S TRADE MARK PROMPT SERVICE

This trademark guarantees to you quality in material and workmanship — perfect fitting parts.

HILL-SMITH METAL GOODS COMPANY

MANUFACTURERS OF MOTOR PARTS AND ACCESSORIES

REPAIR PARTS FOR THE FORD AND OVERLAND CARS

BOSTON, MASS.

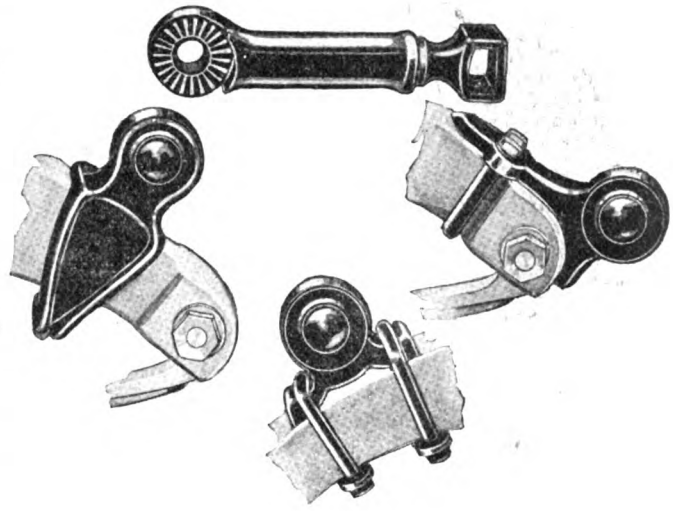
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HALLADAY BUMPERS

STANDARDIZED and SIMPLIFIED

The necessity of heavy investments by the dealer eliminated by the

HALLADAY
Standardized Unit



By means of these four parts and a supply of bars, the dealer is enabled to assemble a bumper to fit perfectly 90% of all cars with forward frame extensions and the rear of most cars with either three-quarter elliptic springs or extended frames.

Bear in mind, these assemblies are not "make-shifts," they are as perfectly adapted to the car as are the special bumpers built for the same cars, with the advantage of a wider adjustment for height, etc. With these fittings, all Halladay bars may be used including the new "MULTIPLE SPRING BAR."

Write for Catalog of Our Complete Line of Bumpers and Accessories

L. P. HALLADAY Company

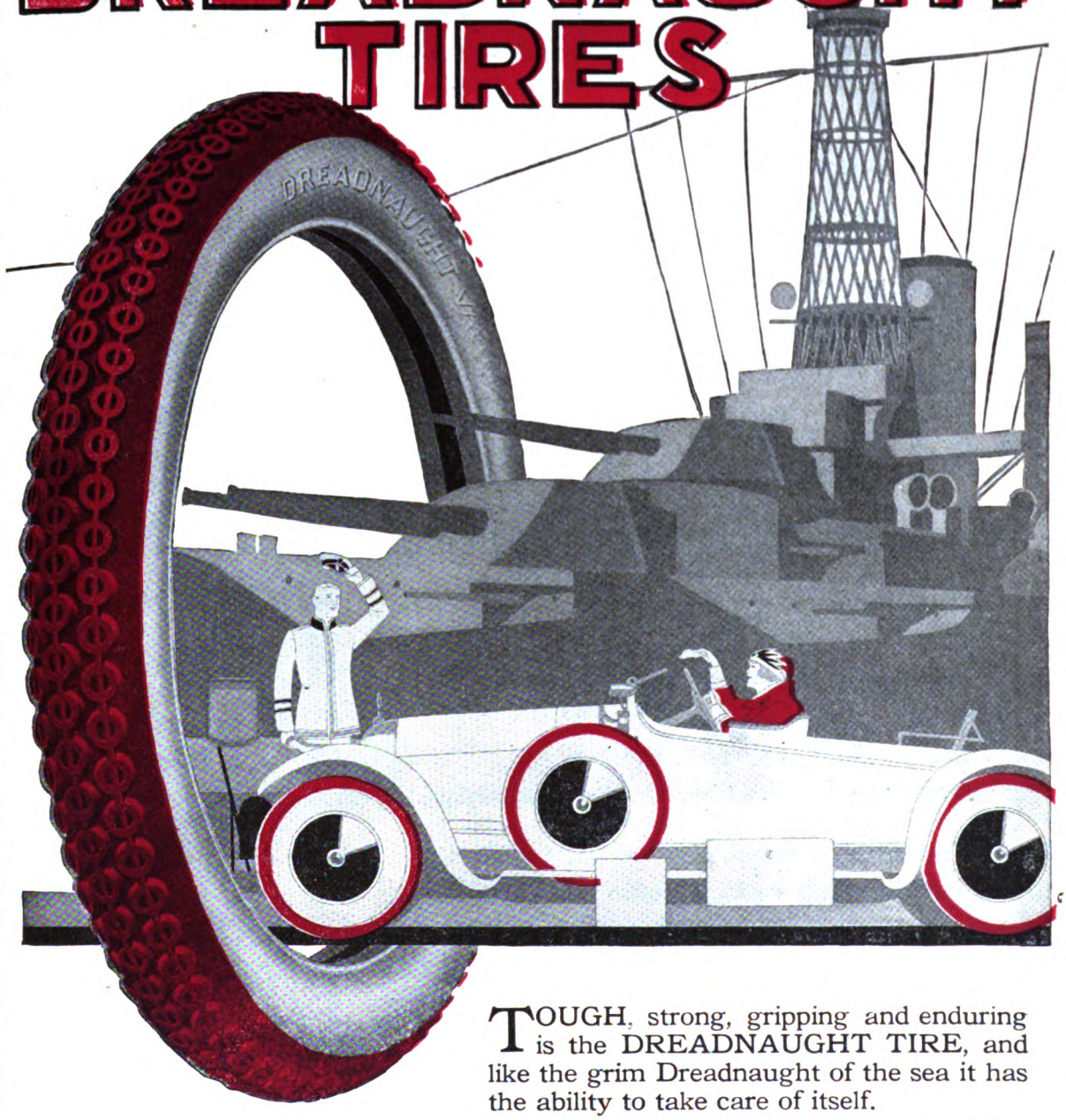
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Empty a measure of Dry Fuel into the Model "E"—

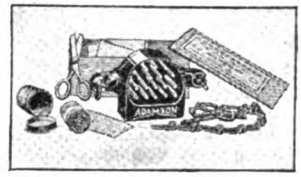




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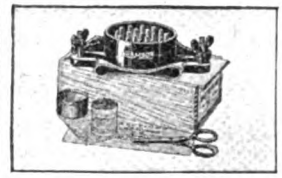


Complete outfit includes Vulcanizer, 12 Patches, can of Dry Fuel, Measuring Cup and Directions. Extra box of 12 Patches, 25¢; Extra can of Dry Fuel, 50¢. **$1.00**



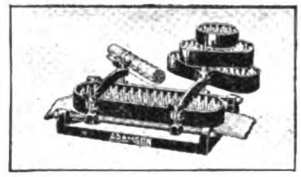
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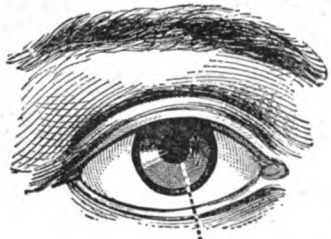
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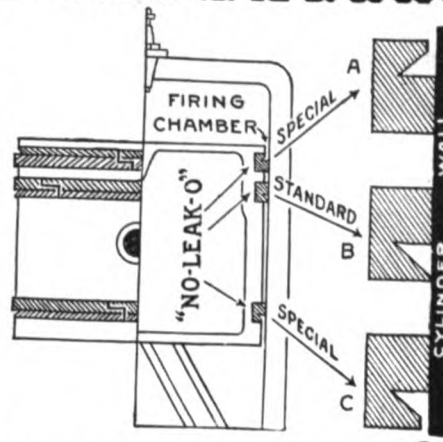
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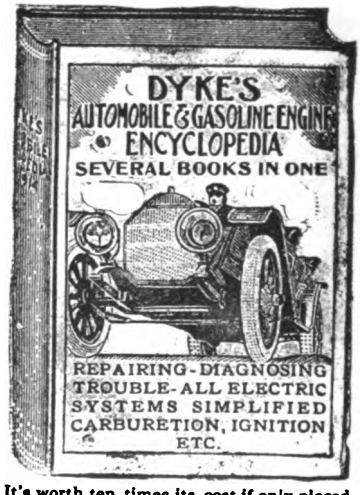
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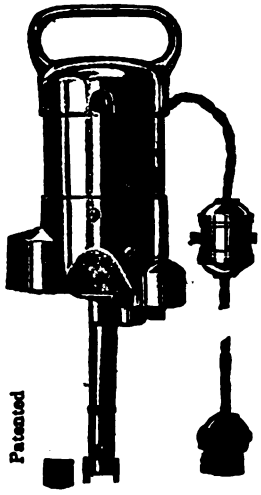
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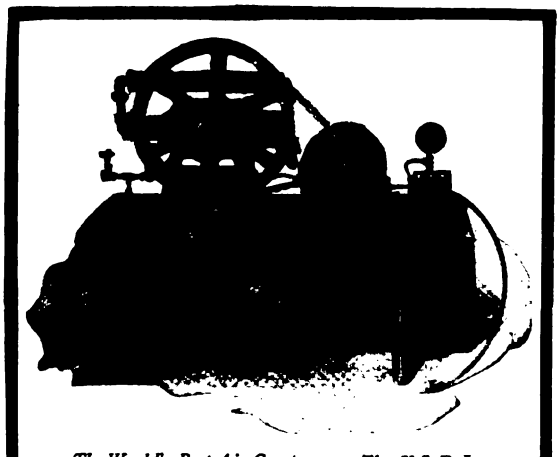
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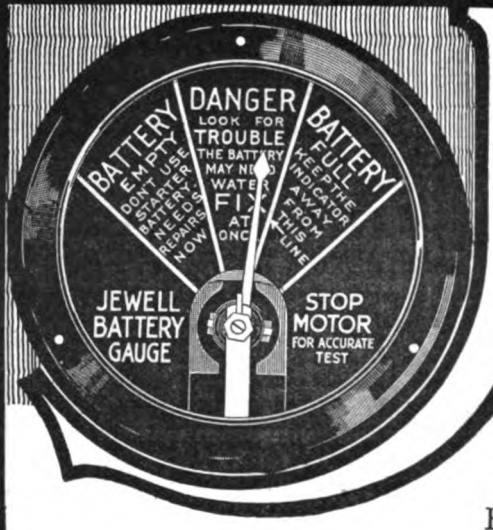
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Tells you everything you need to know without the inconvenience and discomfort of hydrometer or other tests.

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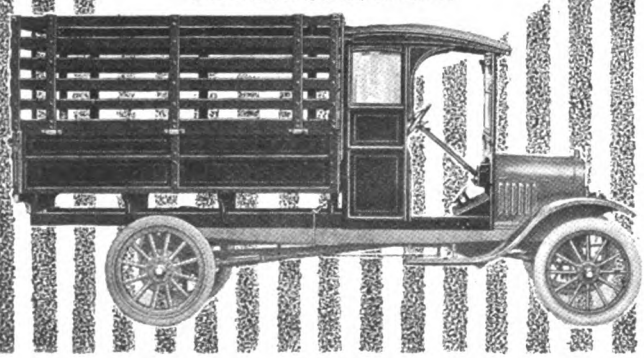
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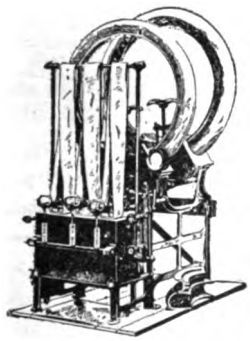
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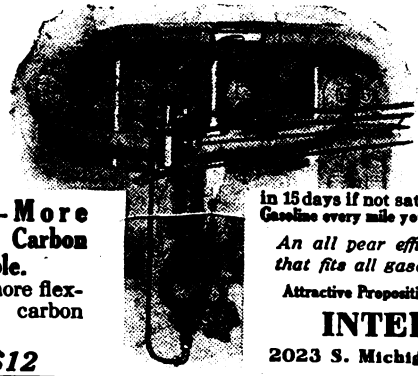
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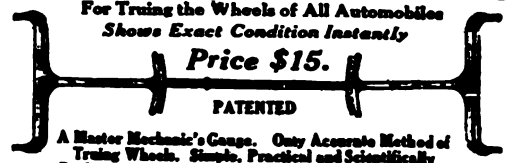
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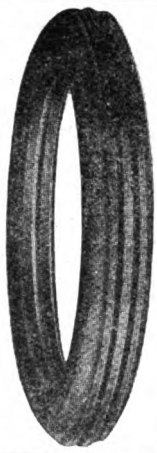
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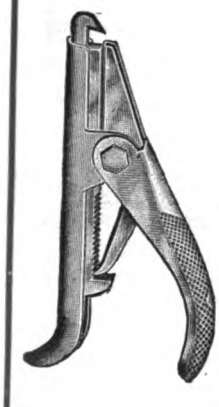
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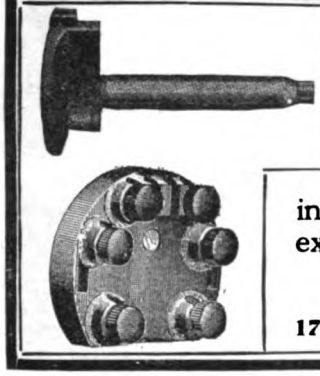


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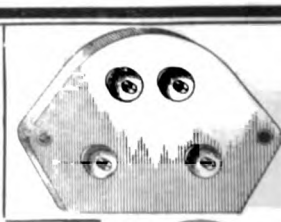
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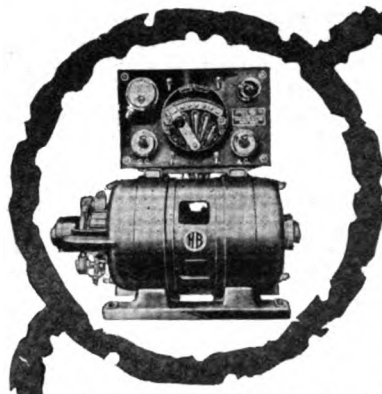
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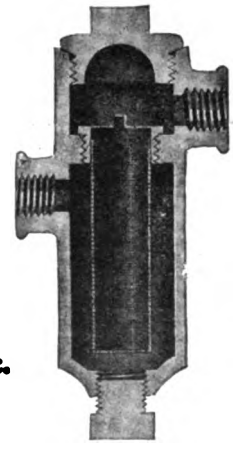


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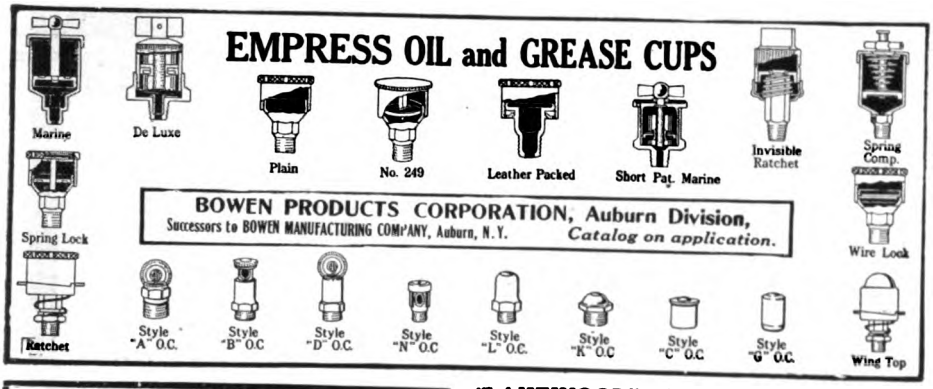
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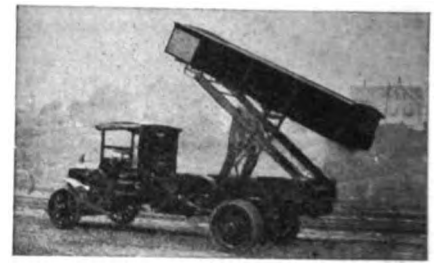
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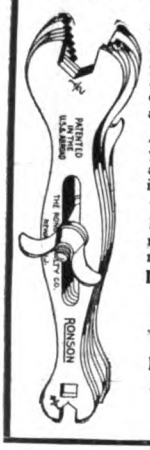
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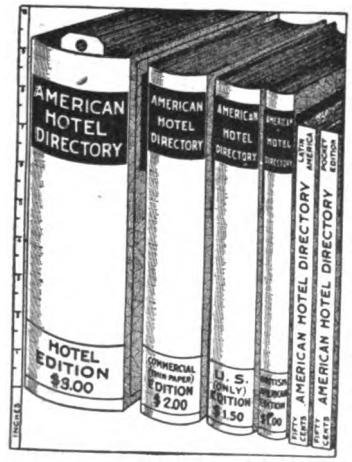
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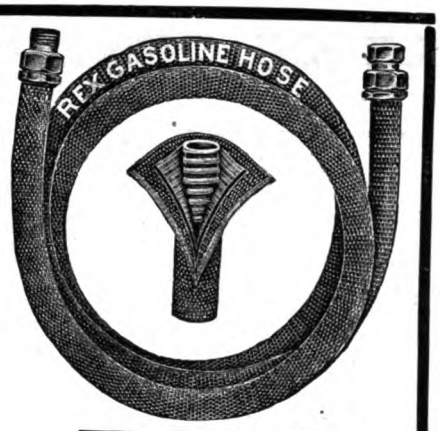
Cleans BOTH sides of windshield in one operation with one hand while driving



(TRADE MARK)

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General Sales Office
FULTON SALES CO., Karpen Bldg., Chicago, Ill.



REX
THE GASOLINE HOSE OF QUALITY

Steel core covered with Gasoline Proof Gum over which is woven a heavy cotton jacket. Couplings to fit all pumps. Sizes ¾", 1" and 1¼". Any lengths. Fully Guaranteed.

MANUFACTURED BY
CHICAGO TUBING & BRAIDING CO.
CHICAGO.
FOR SALE BY ALL JOBBERS.

Quality and Prices TALK

GEARS SHAFTS BEARINGS
For All Cars
TIRES — NEW — USED — TUBES
Exceptional Values at Lowest Prices.

	Factory Blemished New Tires	New Tubes	Used Tires	Used Tubes	Double Tread Tires
28 x 3	$ 7.75	$2.25	$3.50	$1.25	$4.15
30 x 3	7.50	2.00	3.75	1.35	4.75
30 x 3½	9.55	2 40	4.65	1.45	5.80
32 x 3½	11 25	2.65	5.25	1 50	6.75
31 x 4	13.95	2.80	6.75	1.65	6.95
32 x 4	13.45	2.90	7.00	1.60	7.15
33 x 4	13 55	3.35	7.50	1.70	7.80
34 x 4	15.90	3.50	7.75	1.70	8.00
34 x 4½	17.85	3 80	7.90	1.75	9.65
35 x 4½	21.00	4.00	8.50	1.80	10.15
36 x 4½	18 95	4.00	8.00	1.85	10.40
37 x 5	21.50	4.00	9.50	2.10	11.50

All tires 10% more for Non-Skid. Other sizes in proportion.

Open Evenings and Sundays.

One dollar or deposit sufficient to cover express cost required with each order.

Shipments Made Promptly Subject to Inspection.

AUTO NEEDS CO.
1602 S. Michigan Ave. Chicago, Ill.
Dept. P1.

INDESTRUCTIBLE
Ever Safe Emergency Brakes for Ford Car

Adjustable. Will fit any Model T Ford, old or new. Absolute safety. Wide range adjusting shims.



For rear wheels—made of band steel.
Asbestos lined, per pair..... $2.50
Brass lined, for extreme conditions, per pair $3.50
Extra flexible interchangeable metallic linings (ready to attach), per pair..... $2.25
Unconditional Guarantee
No changes to make—installing directions on every box.
See your dealer; he has them.
Insist on the Ever Safe.

Never Break Products Co., Bangor, Penna.



Auto Top Roof Cover
"Tailored to Fit any Car"

Easy to apply; you save ⅓ price of new top. We also build new and repair old auto tops and wheels. *Send for catalog* and samples of the goods we use in our top roof and seat covers. Seat covers all prices. Dealers Wanted.
Wheel, Top & Hdw. Co. 1196 Sycamore St., Cincinnati, O.



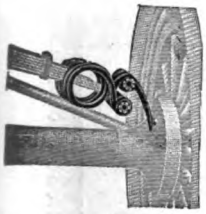
"PERFECTION" Pedal Pads

FOR EVERY MAKE OF CAR
Clamped on in less than one minute. No bolts, or drilling of holes in pedal necessary
Send for free printed matter.
Pat'd. Dec. 21, 1915
Auto Pedal Pad Co., Inc.,
702 Seventh Ave., New York

STOP THE SPRING BREAKAGE.



It's a poor policy to risk repeating the annoyance of a broken or weak spring—and the delay—by saving only a very little in buying or selling a *cheaper* spring instead of a "NEW ERA *BETTER* SPRING."
Don't replace a broken spring with one no better.
Wise dealers—sell only the best—
New Era "BETTER" Springs are the oldest and largest used line for replacement—at same price as from car factories. Made for all cars, GUARANTEED one year against breakage or sagging, graphited between leaves for two years' lubrication.
Write for complete line, discounts—or state requirements and class of business.
NEW ERA SPRING & SPECIALTY CO.,
1171 Hamilton St., Grand Rapids, Michigan.



Twin Spring SHOCK ABSORBER

BEST BY TEST
For Ford, Maxwell, Studebaker, Pierce Arrow and All Cars.
Write for Agents Proposition and Prices
TWIN SPRING CO.,
1000 Boylston St., Boston, Mass.

GENERAL LEAD BATTERY
THE BEST BATTERY PROCURABLE.
Look for the G. L. B. Service Station.
Garage and Repairmen, control the replacement business in your territory.
Write Us About This Today.
GENERAL LEAD BATTERIES CO., Newark, N. J.

Cox "Splash-Pan" Type
BUMPERS

For Chalmers, Hupmobile, White, Mitchell, Oldsmobile, Studebaker, and the constantly increasing number of other cars with splash pan extended to the end of frame.
Write for prices on the whole line.
COX BRASS MANUFACTURING CO.
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The United States District Court, Northern District of Ohio, Eastern Division, has sustained the validity of Patent No. 1,215,904 on Brown Spring Oilers and has held the Diamond Spring Oiler Company an infringer.

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MELLIN'S GEAR SHIFT EXTENSION AT YOUR JOBBERS
OR WRITE TO
M & H - NOVELTY CO.
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Lower Prices On HOWE SPOTLIGHTS

Effective Nov. 1, 1917, prices on Howe Spotlights were materially reduced. $8 models now $6.50. A wonderful new model with all Howe standard features at $5. A new and better Howe Junior at $4. All have mirrors.
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INSYDE TYRES

Inner armor for automobile tires. Prevent punctures and blowouts. Double mileage of any tire, old or new. Easily applied without tools. Used over and over in several tires. Will not heat or pinch. Cheaper and better than double treads, etc. Details Free. *Distributors and Agents Wanted.* Sales Guaranteed. Liberal Profits.
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Forty Thousand Dealers *are selling* BENFORD'S
GOLDEN GIANT SPARK PLUGS
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"Grip Like a Mud Hook—Ride Like a Bare Tire"

BEARINGS SERVICE COMPANY
Nation-wide Service on Bearings
Timken—Hyatt—New Departure Bearings for All Cars
Branches In All Principal Cities
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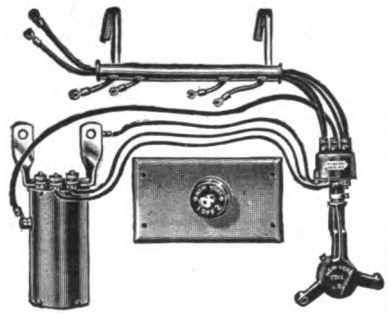
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FORD OWNERS, ATTENTION!

NEW YORK Vibrator-Les Coil IGNITION FOR FORDS



IF you wish to be forever done with all ignition trouble, vibrator adjustments, replacements, worn out timer, short circuits, hard starting, jerky uneven running, and large repair bills, install VIBRATOR-LES COIL IGNITION—and double the value of your Ford.

Regular Magneto used—no after expense.
Easily installed by yourself.
Guaranteed by a firm of proven reliability.

Complete to the Simplest Detail—$20.00

Act at Once and Know the True Value of Your Ford

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Western Distributors: Gray-Heath Co., 1440 Michigan Ave., Chicago, Ill.

Use the old car another year. Just a little time applying

"F-S" "Evernew" Auto-Body Enamel

makes her look "almost as good as new."
It is easily applied, dries quickly, hard and durable. Does not show brush marks. Eight standard colors—special shades to order.

Send for color card

FELTON, SIBLEY & CO., Inc.

Mfrs. of Colors, Paints, Varnishes since 1863

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"Economic efficiency is necessary to win the War."

"Evernew" Auto-Top Dressing revives and waterproofs old tops, yet leaves them pliable. (18-1)



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Da-cote means an enamel which dries in one day. "Paint it this afternoon—run it out new tomorrow" is the Da-cote slogan.

This broad band is the exact color of the contents of the can. An aid to customer and salesman. A most attractive package. "The label shows the color."

Motor Car Enamel is your big opportunity for Spring. Three million cars need painting and most owners will paint their own cars in this war year.

Our New Product is ready

For months, our chemists and varnish experts have been perfecting Da-cote. Back of those months of special effort, is fifty-two years' experience in making the finest of materials for finishing coaches and automobiles.

Da-cote is designed for the amateur or professional painter. It flows on smoothly, leaving no brush marks, and dries over night. It produces a fine, hard, glossy, elastic finish which will withstand exposure, dust and washing. Da-cote is furnished in black, white and all standard colors.

Da-cote is being heavily advertised in the Saturday Evening Post, Literary Digest, and other magazines—two full pages and two half pages appeared in the Post in March and April. There is bound to be a big demand for it.

Prices, discounts, and terms competitive with other lines of motor enamels.

Write or wire collect for our 16-gallon standard assortment together with window display and Dealers' helps. The season is on—every day lost may mean lost sales.

Murphy Varnish Company

Franklin Murphy, jr., President

Newark, N. J. Chicago, Ill.

Dougall Varnish Company, Ltd., Montreal, Canadian Associate

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DU PONT

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We need at once in many cities of 10,000 or more population:

The Leading Auto Top Maker
The Leading Auto Body Upholsterer
The Leading Auto Refinishing Concern
The Leading Auto Accessories Dealer
The Leading Boat Maker and Repairer

to supply the inquirers who answer our advertisements of

Rayntite Fabrikoid Top Material
Fabrikoid Motor Quality Upholstery
Fabrikoid Marine Special
Fabrikoid Truck Special
Harrison's Auto Enamel
Harrison's Marine Paints and Varnishes
Py-ra-lin Transparent Curtain Windows
Pontoklene Tar Remover and Cleaner
Du Pont Leather Renovator
Du Pont Outdoor Brass Lacquer

To insure quick action, please give us the following information:

Do you buy through a jobber? State whom and where.

If you buy direct and are not rated, give bank and commercial reference.

State nature of your business and line which interests you.

If we refer to you all inquiries from your vicinity, will you do your best to sell them our product?

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SALES PROMOTION DIVISION

DUPONT, WILMINGTON, DELAWARE

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There's a Harvey Jobber Near You

THE superiority of Harvey Springs has been so well proven by actual experience that there is no longer any question in the minds of garagemen and car owners as to their pre-eminence in strength, resiliency, endurance and all 'round dependability.

Service — Founded on Quality

Having built a Spring of such well established merit, a Spring that has won the respect and support of the entire motor world, it was for Harvey thoroughness to back up this Spring with a service as good as the Spring itself.

Over 900 Styles Always in Stock

In every state in the Union, there is a Harvey Jobber with a large stock of Harvey Springs always on hand. It is his business to see to it that your order is filled and shipped by the fastest route whenever you call on him for help.

THERE'S A HARVEY JOBBER NEAR YOU—Drop us a card and we will send you his name and our Spring Book giving measurements, weights, and sizes of over 900 different styles of Springs and other valuable information that you should have. Write today—you may need Harvey Help tomorrow.

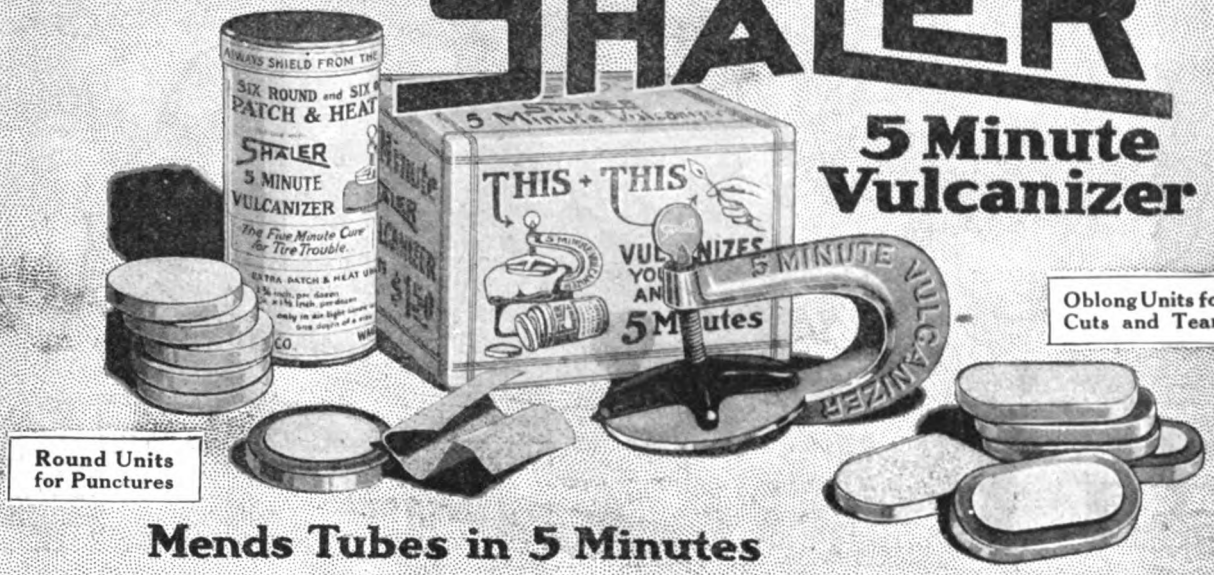
Harvey Spring & Forging Co.

921 17th Street **Racine, Wis.**

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SHALER

5 Minute Vulcanizer



Mends Tubes in 5 Minutes

A Perfect Repair in 5 Minutes

Simply place the Patch & Heat Unit over the puncture—clamp the vulcanizer in position—and apply a match to the combustible disc. In 5 minutes you have a lasting, "feather-edge" repair—properly vulcanized with just the right amount of heat.

Over 500,000 motorists are now using this SHALER Vulcanizer. It should be in every car owner's tool box—ready for instant use—on the road or in the garage.

Complete Outfit, Only $1.50
With 12 Patch & Heat Units

The outfit includes the vulcanizer—six round patch & heat units for punctures and 6 oblong units for long cuts and tears. Each unit is completely assembled—a pure para rubber patch on one side and the chemically treated combustible disc on the other. No acid, gasoline, cement or flame required. Simple—easy to use—SAFE!

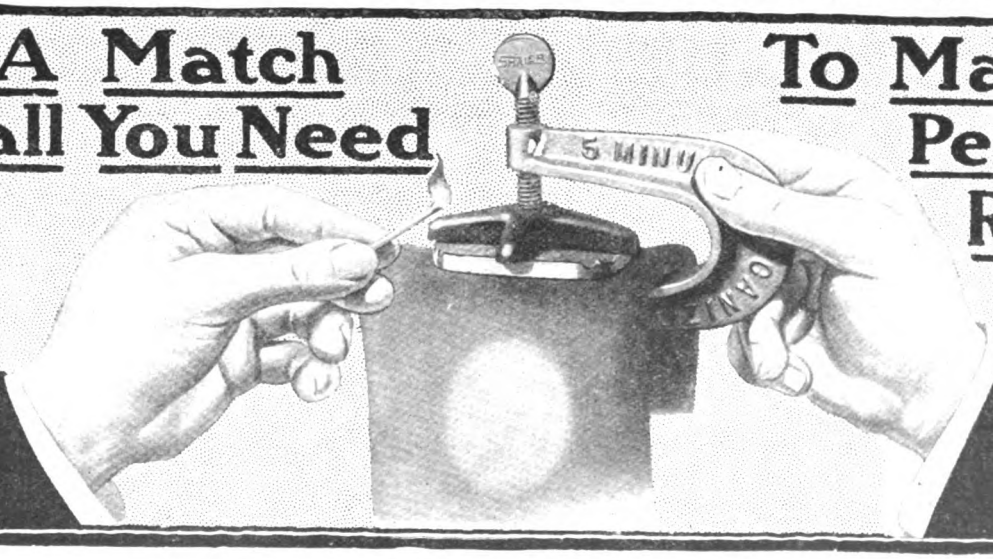
Sold by Accessory Dealers and Garages

Let your nearest accessory dealer show you how easily and quickly the SHALER 5-Minute Vulcanizer will mend your tubes *anywhere.*

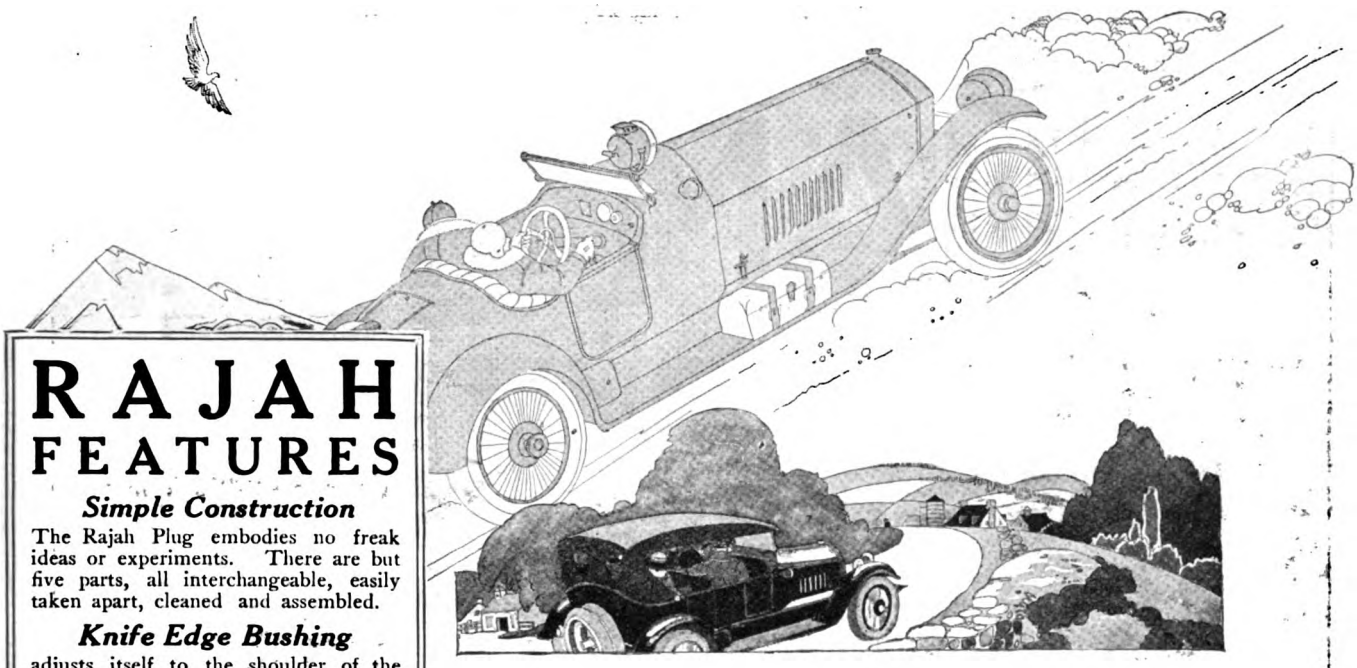
Write for FREE BOOK, "The Care of Tires."

C. A. SHALER COMPANY, 803 Fourth Street, Waupun, Wis.

A Match is all You Need To Make Perfect Repairs



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RAJAH FEATURES

Simple Construction

The Rajah Plug embodies no freak ideas or experiments. There are but five parts, all interchangeable, easily taken apart, cleaned and assembled.

Knife Edge Bushing

adjusts itself to the shoulder of the porcelain. All possibility of injuring the porcelain is thus eliminated when the bushing is tightened down to secure a gas-tight joint.

Insulation

consists of the highest grade, hardfire, heat-resisting porcelain, of special pattern, so assembled as to insure against firing through.

The Button Top and Rajah Clip Terminal

do away entirely with the necessity for either thumb screw, nut or other device for attaching the cable to the spark plug.

Rajah Terminals and Adapters

are furnished so that Rajah Plugs can be used on any car.



Rajah Regular Clip Terminal

Adjustable to any cable. With the extra collar supplied fits any make of plug.



Rajah Ferrule Clip Terminal

With any size ferrule required. Fits any make of plug with the extra collar supplied.



Rajah Thumb Nut Terminal

Adapter for Dodge, Ford, Hup, Hudson, Maxwell, Mitchell, Packard Twin Six and Pullman.



Rajah Stud Terminal

Adapter for Buick, Chevrolet and Oldsmobile.

Manufactured by

Rajah Auto-Supply Company
Bloomfield, N. J.

Sales Department
Edward A. Cassidy Co.
280 Madison Avenue, New York

Any old hill on high

THAT'S the proud boast of the car owner who can do it. But think of the thousands who can't! They blame the car but it's usually the spark plugs.

In every big hill climbing event Rajah Plugs have added to their reputation. They will put into any man's car a life and energy he never suspected.

Play up the hill climbing, racing and airplane records of Rajah Plugs in making sales. It is this kind of efficiency that car owners want.

Sell them in sets—a single Rajah doesn't help. It is limited by the efficiency of the others.



Your jobber can supply you with Rajah Plugs and Terminals if your stock is low.

RAJAH SPARK PLUGS

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ADAMSON

THE COMPLETE LINE OF
VULCANIZERS

Money Makers for the Dealer

Money Savers for the Motorist



MODEL "E" $1.00
5-Minute Vulcanizer
Uses Adamson Dry Fuel or gasoline. Repairs tube punctures permanently in 5-minutes.



MODEL "T" $1.50
For ordinary repairs on inner tubes.



MODEL "U" $2.00
Repairs tubes and cases. Mends tread cuts and small blow-outs.



Write for Adamson store displays and dealer helps

DEALERS:

There's an Adamson for every kind of tube and casing repair that a motorist can make. You needn't miss a single sale when you stock the Adamson line.

The high price of tires and tubes and the nation-wide demand for Conservation will practically double the number of Adamson users—now over a million.

To show Adamsons is to sell them. Every motorist knows they are easiest to use, quick and sure in results, and make the strongest possible repair.

Adamsons cost least to buy and operate; any model will use common gasoline—always dependable and easy to get.

STOP THAT LEAK

Tread cuts and surface injuries admit moisture and sand into the fabric to rot and weaken it, causing blow-outs and short mileage.

—Sell Adamsons to repair such injuries in a few minutes time, while the tire remains on the wheel.

Practically every motorist wants an outfit to vulcanize his own tube punctures and blow-outs.—Sell him the dependable Adamson to make quick and lasting repairs—at home or on the road—without the use of cement.

For quick sales and no dead stock carry Adamson Vulcanizers and Repair Gum.

Sold by all Jobbers

ADAMSON MANUFACTURING CO.

EAST PALESTINE, OHIO.

We also make Adamson Ford Brake Shoes, Lined and Unlined.



MODEL "S" 12.00
For private garages and repair shops. Mends cases and tubes.



ADAMSON REPAIR GUM
Essential for best results with any portable vulcanizer. Perfect adhesion without use of cement.



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The MUNGER "ALWAYS TIGHT" PISTON RING OUTFIT—
8 Always Tight Rings (Regular Size)
4 Always Tight Rings (Overwidth)
1 Regrooving Tool
1 Ring Insertion Tool

MUNGER "Always Tight" Piston Rings

When piston grooves become slightly worn it is impossible to fit any rings in them gas-tight without first truing-up the grooves. With each complete outfit of Munger "Always Tight" Piston Rings is one *overwidth* ring for each piston (to be used in worn grooves) and a Munger Re-grooving Tool with which worn grooves can be straightened quickly and accurately without resorting to expensive lathe work, and without even disconnecting the piston from the connecting rod.

Every car owner and repair man will appreciate the great saving of time, labor and money effected by this simple method.


Ready to insert the Munger Re-grooving Tool to true-up a worn piston groove


The Munger Re-grooving Tool in position for cutting. Testing width of groove with an over-width ring


A Munger "Always Tight" Piston Ring being slipped over the Munger Ring Insertion Tool


Showing how easily Munger "Always Tight" Piston Rings can be placed in the piston grooves with the Munger Ring Insertion Tool


The MUNGER "Always Tight" expansion joint

As soon as other rings begin to wear they begin to lose compression.

This is not true of MUNGER "Always-Tight" Piston Rings. They remain *"permanently"* gas-tight because the patent process of peening them makes them conform to the shape of the cylinder—and because the *"Always Tight" Expansion Joint compensates for wear as it occurs* without leaving any opening through which gas can escape. This wonderful expansion joint makes Munger Rings practically permanently air-tight.

SPLITDORF ELECTRICAL CO.
NEWARK, NEW JERSEY

Splitdorf Branch Houses and Service Stations:

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Chicago, 2613 S. Michigan Av.	New York ..... 7 West 61st St.
Dallas ..... 402 S. Ervay St.	Philadelphia .... 210 N. 13th St.
Detroit, 1295 Woodward Ave.	Pittsburgh, 5943 Ellsworth Ave.
Kansas City, 1827 Grand Ave.	San Francisco ....1022 Geary St.
Los Angeles, 1275 S. Hope St.	Seattle .....1628 Broadway
Toronto .....469 Yonge St.	

Accessory Dealers and Garage Men!

Any jobber will supply you with Munger "Always Tight" Piston Rings. Order them now! List price for all sizes up to 3¾ in. diameter, $1.25 per ring.
With each complete outfit of rings, a *Munger Piston Re-grooving Tool* and a *Munger Ring Insertion Tool* are supplied without extra charge.

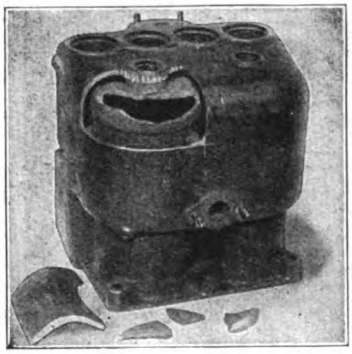
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Thousands Of Cars To Be Fixed Up— Big Profits For You In Auto Repairs



Broken Auto Cylinder



The same Cylinder welded with Imperial Equipment

Auto owners everywhere are this year repairing their present cars rather than buying new ones. Your garage or repair shop will get a big share of this business if you are prepared to handle the big jobs.

Now, more than ever, it will pay you to invest in

IMPERIAL WELDING CUTTING EQUIPMENT

Oxy-Acetylene Process

FIRST IN ECONOMY, EFFICIENCY, SAFETY AND SPEED

Broken transmission cases, axles, cracked cylinders, and all metal parts are quickly and permanently welded, whether in the shop or on the road. An Imperial Outfit is always ready for use. Cuts all steel and wrought iron and decarbonizes cylinders more satisfactorily than by any other method.

Imperial Equipment daily proves itself a real repair necessity, often paying for its cost through the saving effected by a single operation. Write us today for our Free Catalog, containing complete information regarding cost of operation, work done, etc.

To Live Jobbers

Wide-awake jobbers, alive to the possibilities of the auto repair field, will avail themselves of the profit opportunities of our whole line. Besides Imperial Welding and Cutting Equipment and supplies, we manufacture highest grade Accessories such as Imperial Compression Couplings, Gasoline Cocks, Strainers, etc.

WRITE TO-DAY!

THE IMPERIAL BRASS MFG. CO.

530 South Racine Avenue CHICAGO, ILL.

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ATTENTION

To Dealers in and Users of Brake Lining for Automobiles and Belting

IN the case of The Scandinavia Belting Company, Plaintiff, against the Asbestos & Rubber Works of America, Inc., of New York City, Defendant, the District Court of the United States for the Southern District of New York has recently entered an injunction in our favor enjoining the Defendant, the Asbestos & Rubber Works of America, Inc., from selling or offering for sale belting or brake lining, not of Plaintiff's manufacture, under the names or designations Scandinavian Woven Lining, Ford Scandinavian Woven Lining, Ford Scandinavian Brake Lining, Scandinavian Weave, Scandinavian Type, Scandinavian and the abbreviated form of the word Scandinavian, to-wit, Scand., or under any word or words of like import.

We take this opportunity to again warn the public from buying or selling any belting or brake lining not of our production under any of the foregoing names.

THE SCANDINAVIA BELTING CO.

106-108 READE STREET, NEW YORK CITY.

NEW YORK

Boston Cleveland Easton Pittsburgh Chicago
Atlanta San Francisco Los Angeles Portland (Oregon)

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"YANKEE" Ratchet Tap Wrench

Works Where Others Won't



"YANKEE" TOOLS
Make Better Mechanics

This Tap-wrench has the famous 'YANKEE' Ratchet Movements.

No. 250—Length, 3¼ in. Diameter of chuck, ¾ in. Holds up to 3/16 in. taps. **$1.60**

No. 251—Length, 5 in. Diameter of chuck, ⅜ in. Holds up to 5/16 in. taps. **2.20**

No. 1251—Length, 13 in.—for work requiring long reach. Same chuck as No. 251. **2.80**

Write us for the "'YANKEE' Tool Book," FREE. It illustrates and describes the many ingenious 'YANKEE' Tools for saving time and labor in the garage, in drilling and working in metal, boring in wood and driving screws.

Multiplies Man's Power

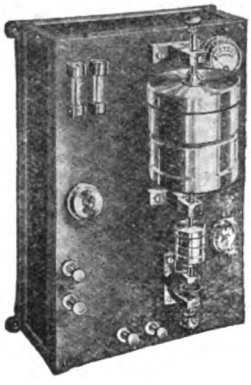
The "Ratchet" makes it easy to tap holes in close quarters and where interfering parts render it impossible to use ordinary tap-wrench without taking down the construction.

Three positions of Ratchet Shifter give Left-hand, Right-hand and Rigid adjustments, instantly adapting the tool to any situation and giving it a working efficiency unknown to other tap-wrenches.

The crossbar is held central, or at either end, by a friction device; and is entirely removable for close packing in tool chest. Knurled thumb-piece, at top, to start or back out taps quickly; provided with counter-sunk hole for using the tool on lathe center when desired.

Your dealer can supply you

NORTH BROS. MFG. COMPANY, PHILADELPHIA



GARAGES, SERVICE STATIONS, INDIVIDUAL OWNERS



For charging batteries, breaking down sulphation or for any other purpose where it is necessary to change alternating current to direct current,

The Breco Converter

Is far superior, highly efficient, light and rugged—easy to operate, no expensive installation necessary.

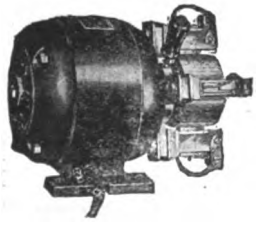
BUILT FOR FROM 1 BATTERY UP

PRICES RANGE FROM $24.00 UP



Fully Tested by Years of Practical Application

Battery charging becomes a very simple, inexpensive and mighty profitable matter with The Breco Charger.



Write for Catalogue No. 21

THE BRECO ELECTRIC CO.

206 Huron Street **Toledo, Ohio, U. S. A.**

SOLE LICENCEES

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The First of May Thrift Stamp Day In The U. S. A.

The Active Co-operation of Every Reader of AUTOMOBILE DEALER AND REPAIRER Is Urgently Requested To Make It A Success

May 1st, 1918, will be observed throughout the United States as Thrift Stamp Day! On that day retail stores everywhere in every line of business will ask customers to take **part of their change in Thrift Stamps!** It will be patriotic for every man, woman and child to accept at least one Thrift Stamp as change on every purchase made that day—and to make as many purchases as possible on May 1st.

Here is a big, practical way of getting millions of Thrift Stamps into the hands of the people of the United States, and of insuring the success of the Government's War Savings Stamps campaign. Thrift Stamp Day will **help everyone.** It will prove a tremendous boost to business. On May 1st, 1918, the nation should do the biggest total retail business of any single day in our history! The beneficial habit of Thrift will be sown broadcast among the citizens of the U. S. A.! Most important of all, Uncle Sam will be furnished with the sinews of War and Victory!

American business must go "over the top" **at once** in a quick drive to make Thrift Stamp Day an overwhelming success. You wholesalers, you jobbers, you salesmen, must **talk** Thrift Stamp Day among your trade, arouse the **enthusiasm** of the retailers, the storekeepers, the clerks behind the counters. Uncle Sam **needs your help.** A practical **plan** has been prepared showing how each one of you can "do your bit" to make Thrift Stamp Day a red letter day in American business annals. Write for this plan **today without fail.** Remember, in helping Uncle Sam you are helping business and helping yourselves. Address Mr. W. Ward Smith, National War Savings Committee, 51 Chambers Street, New York City.

W. S. S.
WAR SAVINGS STAMPS
ISSUED BY THE
UNITED STATES
GOVERNMENT

NATIONAL WAR SAVINGS COMMITTEE
51 Chambers Street **New York City**

(This space donated by AUTOMOBILE DEALER AND REPAIRER)

W. S. S.
WAR SAVINGS STAMPS
ISSUED BY THE
UNITED STATES
GOVERNMENT

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THE NAME THAT HAS BUILT OUR BUSINESS IS NOW OUR BUSINESS NAME.

IN THE PRODUCTION OF

TOP & BODY EQUIPMENT

Victoria Tops
One-Man Tops
Winter Tops

Eastern Representatives for the Anchor Detachable Winter Top

Top and Body Hardware of Every Description

Bodies

THE MARK OF

COPPCO

Auto Equipment

DEPENDABLE QUALITY

Seat Covers that fit
Curtains
Tire Covers
Radiator Covers
Cushions
Top and Seat Cover Fabrics
Custom Body Work and Painting

THE NAME OF **GEORGE W. COPP** HAS BEEN A
GUARANTEE OF SATISFACTION

UNUSUAL FACILITIES FOR HANDLING QUANTITY ORDERS

George W. Copp Co., Inc., Formerly NEW YORK AUTO EQUIPMENT CO., Inc. Office and Factory, 351-355 West 52nd Street, **New York**



I EARNED $2200.00 IN FOUR MONTHS



THIS IS RICHARD A. OLDHAM

Mr. Oldham was telegraph operator for the Illinois Central Railroad for twenty years. He is fifty-eight years old. During all those twenty years he drew the customary monthly salary of a telegraph operator—no more—no less. One day he read one of my advertisements and the possibilities of making money in the Auto Tire Repair Business. In a few weeks he had purchased and installed a Haywood outfit, and was doing business for himself. He was **His Own Boss.** A short time ago he wrote us that his income in four months was as much as it had been in Two and One-Half years as Telegraph Operator. You men who have been left at home—who are beyond the draft age, can and must take up the burdens left behind by others. Oldham is a living example of what can be done. I have 500 places to be filled now. 500 stations where tire repairing is neglected, because there is no one to do it.

I Must Have 500 Men to fill these places within the next 60 days

I have a big interesting book to send you—a book about tires—it explains this business—gives inside figures and profit. Gives actual proof of success—letters of others who are now operating Haywood Shops and making big money. What these men have done you can do. $2500 to $4000 a year is conservative. One machine will give you a start. You can see all business around you—everywhere there are automobiles there are tires that need repairing. You know that. All you do is open a shop—put out a Haywood sign and auto owners will come to you, welcome you and the service you bring them.

Sign the coupon and mail it today, or send a post card or letter.

M. HAYWOOD, Pres.
HAYWOOD TIRE & EQUIPMENT CO.
528 Capitol Avenue, INDIANAPOLIS, IND.



M. HAYWOOD, Pres.
Haywood Tire & Equipment Co.,
528 Capitol Ave., Indianapolis, Ind.

Dear Sir—Please send me your book on Haywood Tire Repair Plants and full particulars on your National Tire Repair Service and details of your FREE school of tire repairing.

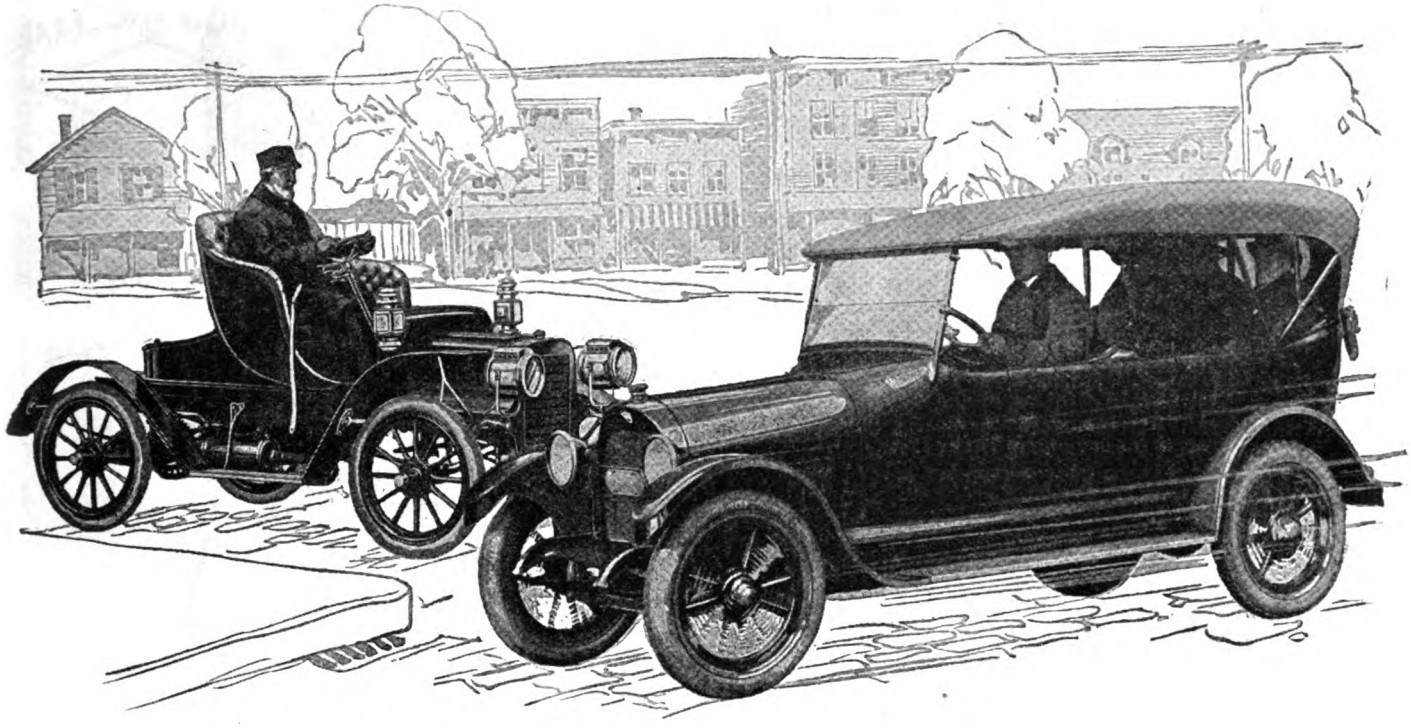
Name.....

Address.....

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Bearings Service for *Any* Car



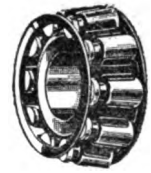
From the *Oldest* to the *Newest*

Can you remember the Globe Car, the Sphinx Car, the Dragon, the Chalfant, or the Great Smith?

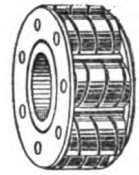
Probably not. Yet, if an owner of one of these cars, or many others whose names have passed into oblivion should ask us for bearings service, we would be ready to supply his needs intelligently and immediately.

Manufacturers of Timken, Hyatt and New Departure bearings have provided us, their official national service representatives, with complete and authentic engineering data. With this unique information and with the complete stocks of these bearings on hand in all of our twenty-two branches, we are able to supply the bearing requirements of practically any make of motor car, motor truck or tractor.

In addition to our twenty-two direct branches situated in the most important automobile centers of America, there are several hundred agents representing us in smaller cities and towns. These agents are equipped to give you expert advice and supply bearings for repair and replacements in a prompt and reliable manner.



Timken Roller Bearing



Hyatt Roller Bearing



New Departure Ball Bearing

Branches In All Principal Cities

New York	San Francisco	Kansas City	Indianapolis	Omaha
Detroit	Los Angeles	Dallas	Rochester	Pittsburg
Chicago	Atlanta	Cleveland	Philadelphia	Portland, Ore.
Boston	Seattle	Denver	St. Louis	Toronto, Can.
	Minneapolis		New Orleans	

BEARINGS SERVICE COMPANY

BEARINGS SERVICE COMPANY

GENERAL OFFICES: DETROIT, MICH.

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Akron-Williams

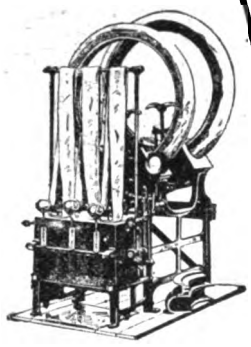
TIRE REPAIR EQUIPMENT

AKRON-WILLIAMS A-W PRODUCTS

Used by ALL Leading tire companies in their own factories, and sold and recommended by them to their Dealers all over the World.

Complete line of tools and equipment for all tire and tube repairing.

SEND FOR LATE CATALOG



THE WILLIAMS FOUNDRY & MACHINE CO.

"Everything for the Tire Repairman"

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EXCLUSIVE DISTRIBUTORS FOR CALIFORNIA:
The Waterhouse & Lester Co., San Francisco, Oakland and Los Angeles

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S-M-C

Trade Mark Registered U. S. Pat. Office

ASBESTOS BRAKE LINING

Silent Sturdy Slip-Proof

Master of Every Motoring Emergency
Cannot Burn, Glaze or Crumble

The letters **S-M-C** on a roll of brake lining protect the man who buys, the man who sells and the man who equips the car.

Look for those letters—**S-M-C**—insist on them.

S-M-C means **Safety Made Certain.**

Absolutely certain; because right materials, rightly treated and tightly woven make this the real asbestos brake lining.

Made in rolls, of all widths up to 6 inches.

DEALER'S COUPON

Staybestos Mfg. Co.
5541 Lena St., Phila.

I want your dealers' proposition on S-M-C Brake Lining and Universal Transmission Lining, particularly on your $1.00 Ford Set.

Name .....
Address .....
City and State .....

UNIVERSAL

Trade Mark Registered U. S. Patent Office

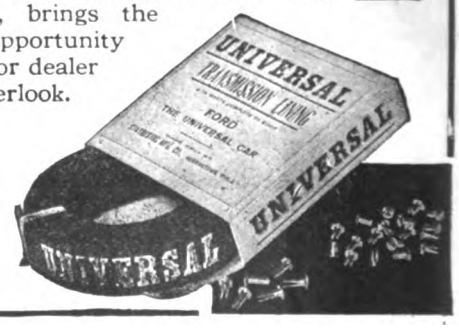
TRANSMISSION LINING

A wonderfully efficient cotton lining made by the makers of S-M-C Brake Lining. Compactly woven like S-M-C, treated with a perfected compound — which makes it water-proof and oil-proof. Absolutely chatterless. As quick as it is quiet.

THIS DOLLAR SET FOR FORDS

$1 Complete

—complete with three proper lengths for Ford Transmission bands—and all rivets required, brings the business. An opportunity no Ford owner or dealer can afford to overlook.

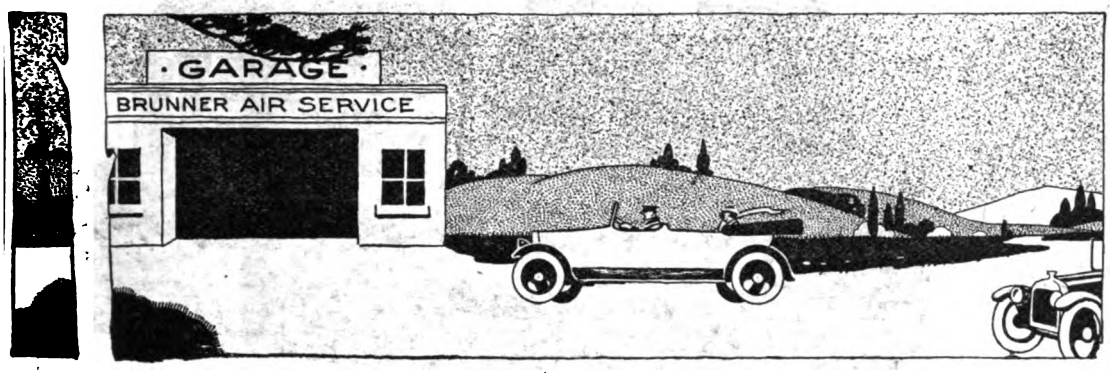


STAYBESTOS MFG. CO.

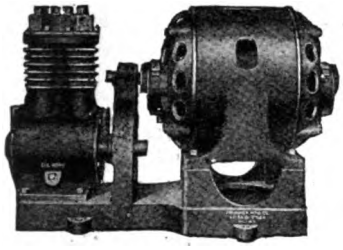
5541 Lena Street, Philadelphia

The "Modern Factory" Equipped to Make All Types of Brake Lining and All Widths Up to 6 Inches

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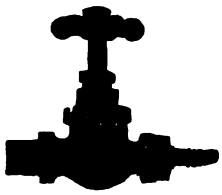


In the Garage Business, Today, Reputations Are Built on Service, and the Very Foundation of Garage Service is a Dependable Air Compressor

INVESTIGATE THE BRUNNER AIR COMPRESSOR



Garagemen who investigate the air compressor field thoroughly before placing their order invariably select the Brunner because they find a predominance of Brunner Air Compressors in the successful neighboring garages and the users always gladly recommend the Brunner, which has rendered high-class service and helped them in building up their reputation.



Years of dependable and efficient service in the garage have built up an enviable reputation for the Brunner Air Compressor, which is being maintained by the continued dependability of Brunner Compressed Air Service.

Dependable Compressed Air Tanks and Fittings Are Just as Necessary as an Efficient Air Compressor



A leaky needle valve, tank or air hose will reduce the efficiency and shorten the life of a good air compressor as well as add to the operating cost—and an improperly constructed air tank, an inaccurate air gauge or an unreliable safety valve will render a compressed air plant absolutely dangerous.

Brunner Compressed Air Tanks and Fittings Are Both Safe and Reliable and will permanently increase the Efficiency of Any Imperfect Installation



A length or two of Brunner "Resistoil" Air Hose would permanently reduce this item of expense and convince any garageman that it is by far the best air hose obtainable.

Our new No. 15 Catalogue is the most complete and comprehensive book of its kind ever published. We will be glad to send you the catalogue and the name of the Brunner Jobber who covers your territory.



BRUNNER MANUFACTURING COMPANY

Main Office and Plant:
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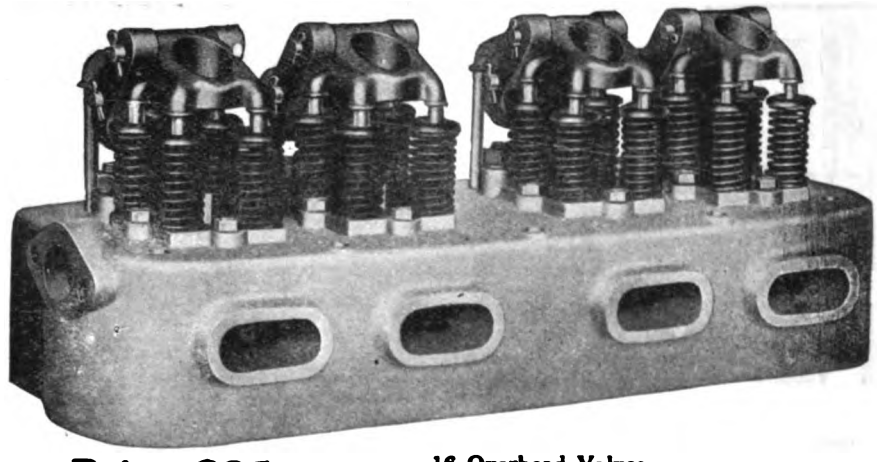
Cincinnati Branch:
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"The Motorist Who is Brunnerwise—Knows Brunner Service Satisfies"



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Make Your Ford a $3,000 Car from the Standpoint of Motor Service



Price $95

16 Overhead Valves for Fords

SPEED POWER ECONOMY

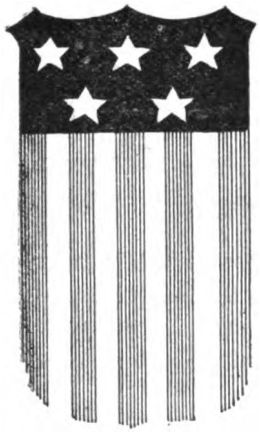
Speed to climb the steepest hills as you never dreamed of before. Power to double the value of your converted Ford truck, the load carrying capacity of which is only limited to the strength of the rear axle. Speed for the road or for the track to rival the high cost racing cars. A long list of racing car drivers, winners of speed contests, show what you can look for if you want a snappy speedster or a race track winner.

Special equipment for touring car, truck and racing car for $95.00. Extra racing equipment at special low prices. Get our quotations on high speed cam shaft, gray iron pistons, aluminite connecting rods, Lynite pistons and rings complete, counterbalances for crank shaft, nickel steel racing gears 3 to 1 ratio, special oiling systems, fast carburetors and beautifully designed racing bodies. Every Ford owner a likely prospect and every Ford converted truck owner a sure sale. An absolute necessity to every owner of a fast Ford.

DEALERS: Get our distributing terms and quotations on the greatest selling specialty in America. Write today.

LAUREL MOTORS CORPORATION, ANDERSON, INDIANA

Made in the "Puncture Proof" City



NATIONAL PRESTIGE

of National Rubber Tire Filler was won through exceptional performance in forever eliminating the bugaboo of auto pleasure—punctures and blowouts.

Made of Pure Rubber, cut in small particles treated, moulded and vulcanized by our special steam process. Fits all the different size casings. No inner tube and air used, eliminating the cause of all tire trouble. Stops the expense of buying, repairing and replacing the inner tubes. Doubles the life of the casing—reducing the cost one-half. Can be transferred and re-transferred as often as is necessary. Has been sold throughout the U. S. and many of the Foreign countries for six years. Has years of actual service record back of it. It has all the easy riding qualities of the air-filled tire, with none of its faults and uncertainties. No waiting to use your car; it is always ready whenever you need it. Let us send you small sample and tell you more about it.

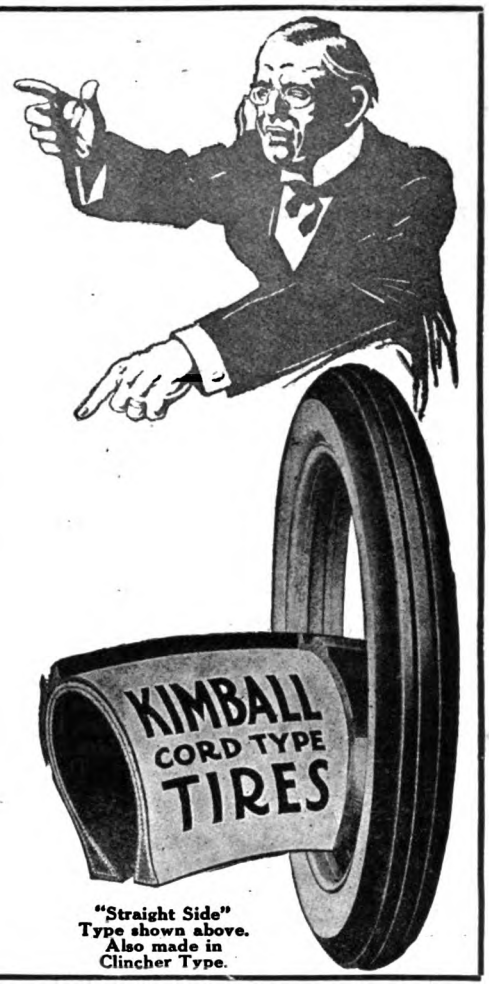


NATIONAL RUBBER FILLER CO.

208 College Street **MIDLOTHIAN, TEXAS**

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BIG TIRE PROFITS
FOR DEALERS WHO SELL
KIMBALL TIRES



"Straight Side" Type shown above. Also made in Clincher Type.

Read This, Mr. Dealer:—

Don't you want to make some real tire money? Then stop handling a few high priced tires that sell slowly and tie up your capital. Meet the cut-rate tire dealers on their own ground. Sell new clean firsts at the prices others get for seconds. Do a big business and turn over your capital several times a year.

KIMBALL TIRES are built to meet the demand for *good* low priced tires. Big dealers in New York, Chicago and other large cities are making more money on this kind of tires than they can make on high priced goods. Why don't you do the same?

You can't compete with the factory branches, distributors and preferred dealers on high priced tires. You can't compete with the mail-order and cut-rate houses on seconds. SELL KIMBALL TIRES and you can beat them both.

There is room for a live KIMBALL dealer in every city and town in the United States. We allow only one dealer in each territory to sell KIMBALL TIRES. Many exclusive KIMBALL dealers are now doing a big business but there is still choice territory to be had. But it is going fast.

Get in touch with us. Send sample order at once. We guarantee our tires to be new firsts and will refund your money if tires are returned in five days in the condition in which they were received. Don't delay.

THE PRICES SPEAK FOR THEMSELVES

	Non-Skid	Tubes
30x3	$ 8.25	$1.90
30x3½	10.35	2.15
32x3½	12.45	2.25
32x4	16.45	3.05
33x4	17.55	3.10
34x4	18.25	3.20

Do you want Clincher or Straight Side?

The Kimball TIRE & RUBBER CO.

Dept. B **1467 Michigan Avenue CHICAGO**

Don't delay. Mail your order today

WINTER BUSINESS—COLD WEATHER MADE PROFITABLE.



CURTIS AIR FREE FROM OIL

The Curtis Compressor is the only one designed to prevent flooding the cylinder with more oil than it needs for lubrication. This, because of our controlled-splash oiling system. No excess oil is forced into the air line. **Oil ruins tires**—air free from oil means fewer blowouts and increased mileage all around for your customers, with less tire adjustments to you. Make your place the most popular one in town. An easy and inexpensive way, is to install a Curtis Compressor. The customer assumes if you have the best free air service, you will have the best service in all departments.

Costs No More Than Ordinary Compressors—But Note The Difference

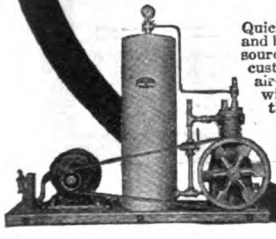
Live garages and service stations are using Curtis Air Compressors. Motorists expect free air service. Why not give them the best and win over new customers by supplying, not only reliable air service, but **Curtis Air—Free From Oil.** A poor air system which shoots oil into the tires, or which is unreliable, drives customers away. Thousands of Curtis Outfits are rendering daily, effective, efficient service all over the country. Your Curtis Compressor can further pay for itself by supplying air for air hoists, painting, cleaning, vulcanizing, blowing dust and drillings from tools, and many other things. Curtis Compressors are backed by manufacturers who have been specialists in this line for twenty-five years.



10 Combinations of Compressor and Tank Sizes—Any Current

Five Sizes—Tight Pulley Only, or Tight and Loose Pulley

11 Combinations of Compressor and Tank Sizes—Any Current



Makes New Customers—Holds Old Ones

Quickly pays for itself in bringing in new trade and holding the old trade, for it not only is the source of a dependable supply of air when your customers want it, but it also supplies clean, cool air—free from oil. Motorists realize that oil will quickly destroy their inner tubes, and, therefore, look for a station that supplies Curtis Air—Free From Oil.

Curtis Compressors are built to meet the requirements of your business in sizes, arrangements and prices. Send coupon at once for full information and attractive prices. It will pay you to investigate our proposition. *Write us today, or ask your jobber for prices—but insist on a Curtis.*

Curtis Pneumatic Machinery Co.
1530 Kienlen Avenue St. Louis, Mo.
530E Hudson Terminal, New York

Curtis Pneumatic Machinery Co.
1530 Kienlen Ave. St. Louis, Mo,

Gentlemen: Please send me full details regarding Curtis Garage Air Compressor—your proposition and low prices.

Name.....

Address.....

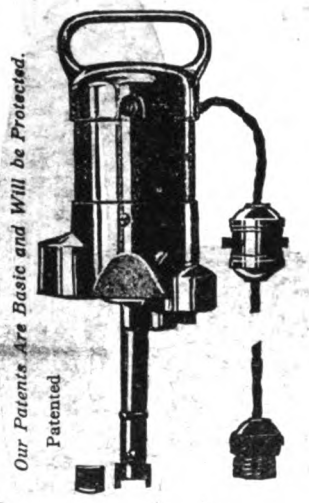
Jobber's Name.....

Address.....

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STENMAN ELECTRIC VALVE GRINDER

The STENMAN ELECTRIC VALVE GRINDER bears the same relation to hand grinding that the vacuum cleaner does to the old corn broom method of carpet cleaning. Once tried it is indispensable. Ten days' usage and it has paid for itself.



Our Patents Are Basic and Will be Protected. Patented

Mull that over a moment—Visualize it—Don't you sense the possibilities of what this device means to you?

Repair Shop Profits Are Made on Labor

YOUR REPAIR SHOP REQUIRES IT EFFICIENCY CALLS FOR IT
YOUR CASH DRAWER DEMANDS IT

The STENMAN will grind a set of eight valves in 20 minutes. Whereas, it takes two hours or more to grind them by hand. And we guarantee the Stenman to do a better and more even job. Also—that a novice can operate it.

Plugs in on any lamp socket—A. or D. current. Regular stock 110, 130 volts. Made for higher voltage where required.

After the most severe tests and tryouts had been made by their engineers, these Grinders have been bought and are in use by the U. S. Army, Naval, Aviation and Postal Departments. Also, by the U. S. Steel Corp., Standard Oil, Gulf Refining, Western Electric and many up-to-date garages and shops on the East.

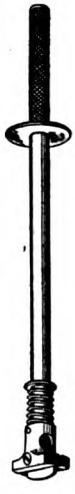
The universal use of the STENMAN ELECTRIC VALVE GRINDER is limited only to our ability to supply them.

An Interesting Distributing Proposition to High Class Jobbers Where We Are Not Already Represented

The Stenman Electric Valve Grinder Co., Inc., 42 Southbridge St., Worcester, Mass.

GET THESE MONEY MAKERS

Hudson Universal Jointed Valve Grinder



No more "botch work" or grinding cylinders only on one side.

This Valve Grinder does not keep you guessing—it goes straight to the mark!

It does such a thorough job of valve cleaning and grinding that you'll wonder how you ever got along without it.

Especially useful in grinding the valves on fourth cylinder of Ford engines or V type motors.

Price - - $1.50

Hudson Crank Case Repair Arm

FOR FORD CARS

The greatest time saver known!



Take the short cut to crank case repairs—eliminate the "long winded" route and put the extra profit in your pocket.

Don't remove the engine from the chassis—simply loosen four bolts, slip the "quick and easy" Hudson Repair Arm in place and tighten—thus in a few minutes you have made the repair.

Price - - $1.50

PATENT WILL BE OFFICIALLY ISSUED BY PATENT OFFICE APRIL 23, 1918.

Hudson Motor Specialties Company 1606 REAL ESTATE TRUST BLDG. PHILADELPHIA, PA.

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Kor-Ker helps transportation

—this year's biggest problem





Are you prepared to handle the tremendous demand for

KOR-KER TIRE TREATMENT

that has arisen now that automobiles are being driven to the utmost for service?

Kor-Ker Tire Treatment will make your car more than doubly efficient.

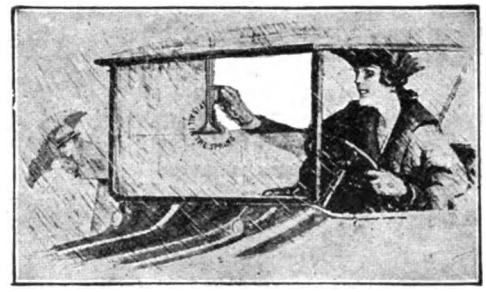
Kor-Ker *absolutely seals punctures—stops* slow leaks, keeps tires at *normal inflation* and reduces blowouts to a minimum.

It preserves rubber—is *not* a filler.

Don't class Kor-Ker with any other product which may have made claims to do what Kor-Ker actually does accomplish.

There's a big liberal profit for you in Kor-Ker. Write for details to-day.

Advance Fall Bookings on Alcola Non-Freeze Solution
The best alcohol substitute.
Now taking orders for Fall.
Send for details.



Here's a Rapid Seller for you

Klear-Sight
Windshield Cleaner

See how simply it works. Just one easy motion across and in a jiffy the windshield is cleared of rain or mist.

Car owners are demanding Klear-Sight because it is big value. Works simply and efficiently. Can be slipped on or off any windshield instantly.

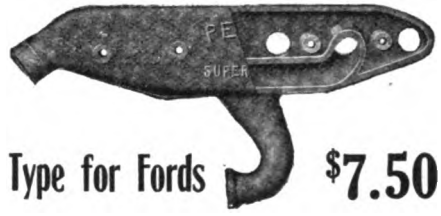
If you haven't Klear-Sight in stock, write us immediately. Retails for $2.00.

Alcemo Mfg. Co., 97 Bridge St., Newark, N. J.

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Are Doing Their Bit

Enable Your Car to Meet War Time Requirements of Economy and Fuel Conservation.

Some of the things that PECK'S Super Heat Manifolds are guaranteed to do:



Type for Fords $7.50

West of Rocky Mountains, $8.50

Cut fuel costs; increase mileage; eliminate carbon; give more flexibility, greater power; stop over-heat of motor; prevent fouled spark plugs; save trouble and satisfy owners.

If your car is not equipped with a PECK'S Super Heat Manifold, order one today. It is guaranteed to give you from 40 to 60% more miles per gallon, with the same efficiency that could be obtained with high-test gasoline.

With the increased cost of gasoline and with the poor quality, it is necessary to use some means that will vaporize the fuel, so the highest efficiency may be obtained. PECK'S Super Heat is the way.

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Dealers and Jobbers Wanted. Liberal Commissions. Write.

PECK'S SUPER HEAT COMPANY, 640 MIDDLEBURY ST., ELKHART, INDIANA

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Open your doors to the steady and profitable sale of

Temme

SPRINGS FOR ALL CARS

DO all the lame cars drive to *your* door for Temme Springs and other things?

In most good towns, Temme Springs and Temme's Triple Action Service are known to be *as good as gold.*

Hundreds of repairers, who have "banked" on Temme and never lost, are putting up Temme highway signs today.

These signs *will* bring in business. Temme has tried them, so he *knows.* And now he offers *you* what won for him.

Temme Springs *"for all cars"* means just what it says—for all cars *since 1902.* Test us by naming the spring you need. Temme Triple Action Service will have it on the way to you the same day.

"For all cars" means *designed* for all cars to factory specifications. And so good are Temme Springs—so prompt the service—so fair the prices—that dealers in *all* cars now buy from Temme in *preference* to the car maker.

You need these springs, this service, these signs. They will make you money, bring new business, help you build the good reputation you are after.

If you delay you may lose this exclusive proposition. Write or wire us now, saying: "Send Temme Spring Service Station proposition at once."

Another Money-Maker



The JOHNSON SHOCK ABSORBER

Sells readily—makes good—pays you a real profit—ask for offer to dealers.

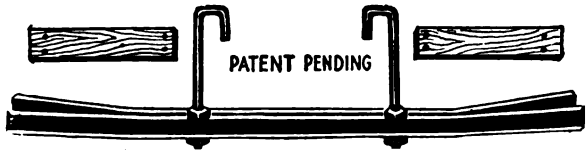
Triple Action Spring Co. 79 E. 28th St. CHICAGO

THE QUALITY IS THERE

NO QUESTION ABOUT IT—YOUR CUSTOMERS WILL BE MORE THAN SATISFIED WITH A

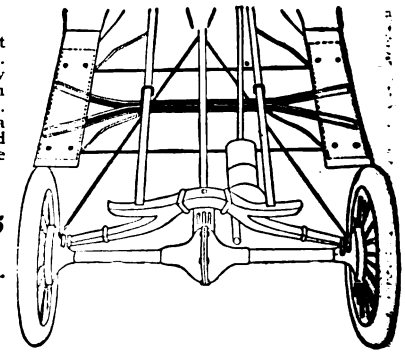
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FOR FORD CARS

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Presto Products

METAL SPECIALTIES MFG. CO.

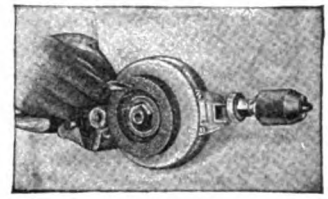
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Electric Drill
Emery Wheel
Valve Grinder
} All in One



This Garage Outfit is making a hit all over the country, cutting cost, increasing capacity and boosting profits.
You will have dozens of uses for the Temco Garage Outfit every day in the year.

It Drills—Taps—Grinds Valves—Sharpens Tools



PORTABLE—you take the tool to the job—not the job to the tool. Attach to any electric light socket (D.C. or A.C.), and it's ready. Starts—Stops—Reverses instantly by finger switch on tool.

Also grinders, tool post grinders, buffers and larger drills.
Temco Tools always satisfy.

Write today for catalog or see your jobber.

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TEMCO Garage outfit

A PATCH

That Will Not Loosen, Leak Creep or Blow Out!



20th CENTURY
Self-Vulcanizing Patch

Makes Permanent Repairs Instantly, and Without the Use of Heat or Tools

It is a three-ply Patch, using a ply of raw Red Rubber next to the inner tube, which guarantees a quick, smooth job of vulcanizing; then a ply of semi-cured rubber next to the khaki cloth. This rubber is not affected by the heat and will not melt, making our Patch absolutely **Leak-Proof**; then comes the ply of best grade khaki cloth, which gives the Patch its strength and durability.



Leak-Proof

This Construction Makes a Patch We Guarantee Not to Loosen, Leak, Creep or Blow Out, and to Give Satisfaction in Every Respect.

Made in 4 sizes	2¼ x 16— 36 Square Inches	$0.50
	4 x 15— 60 Square Inches	.75
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	7 x 75—525 Square Inches (Garage Size)	4.00

If you want a Patch, call for a "20th CENTURY." We make all kinds of Patches, all Sizes and Prices.
If your JOBBER or Dealer has not got them, write to us direct.

20th CENTURY TIRE PROTECTOR CO., MIDLOTHIAN, TEXAS

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"NORMA" BALL BEARINGS

(Patented)

The "nerve centers" of the car and truck—so may be defined the ignition and lighting apparatus. Weakness, inadequacy, at these centers reacts throughout the machine. Failure at these points means a failure of all the nerve-controlled functions of the car or truck. Can a car, truck, or man show "stamina," with an inherent weakness at the nerve centers?

"NORMA" Ball Bearings, by their superlative speed qualities and proved serviceability, contribute mightily to the rugged strength and service capacity of those high-grade magnetos and lighting generators which are the "nerve centers" of all cars and trucks of proved dependability.

Be Sure—See that Your Electrical Accessories are "NORMA" Equipped

THE NORMA COMPANY OF AMERICA

1790 BROADWAY NEW YORK

Ball, Roller, Thrust and Combination Bearings.

"NORMA"



In emergency relief work—where life and death preclude "taking chances" on *any* part of the equipment — invariably Reflex Spark Plugs are used. And it is such facts that make sales for Reflex dealers.

REFLEX equipped White Truck fitted for Emergency Mine Rescue work. An example of REFLEX responsibility.

REFLEX SPARK PLUGS

KEEP THE CAR ON THE GO!

They "Keep the Car on the Go" because *every* Reflex you sell is just as reliable —has been subjected to the same rigid tests—as those used as standard equipment on the White Mine Rescue Truck shown above, and on the thousands of Whites at the war fronts and in industries, everywhere.

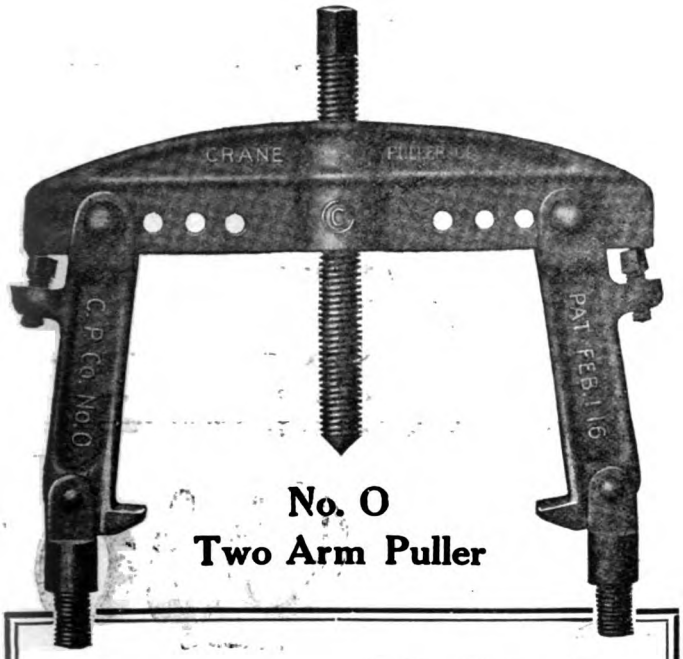
Chromite War-service Porcelain and Non-pit points are used in Reflex Spark Plugs. We authorize you to guarantee any type of the complete Reflex line on a money-back basis.

Write today for our exceptional dealer proposition. Sell the line of Spark Plugs that is based on actual performance.

THE REFLEX IGNITION COMPANY

1711 Payne Ave. Cleveland, U. S. A.

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No. O
Two Arm Puller

Removes All Kinds of Small Parts Easily and Quickly

For the removal of timing gears, magneto and pump shaft gears—all small work, in fact, that is designed to be removed by stud-bolts screwed in tapped holes in the web, in addition to the regular functions of the ordinary puller—no device is comparable in efficiency and simplicity to the new

No. O
TWO ARM PULLER

The forked stud-bolts, shown attached to the hook end of the arm with pins, are furnished blank and can be drilled and tapped by the user for the proper thread of his work. Case-hardened headless set screws can be used for the stud.

This puller takes light work 5 inches in diameter and 3 inches from the end of shaft. It has the new patent Locking Arms, forked stud-bolts and case-hardened screw.

List Price $2.50

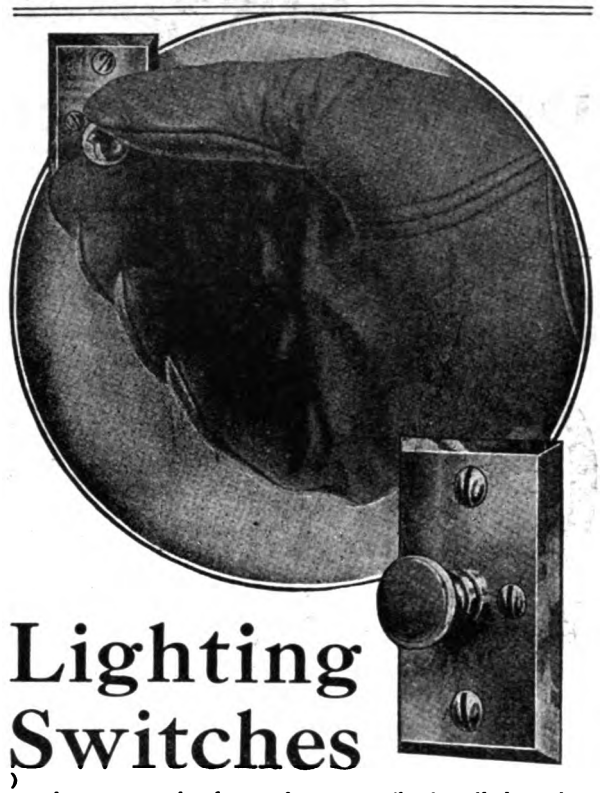
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Designers of Wheel and Gear Pullers for Every Purpose

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Lighting Switches

are the neatest, simplest and most easily installed equipment of their kind on the market.

Easily operated with a gauntleted hand.

Simple construction insures unending service and satisfaction.

Connecticut switches are designed to provide every arrangement of lighting control that can be desired.

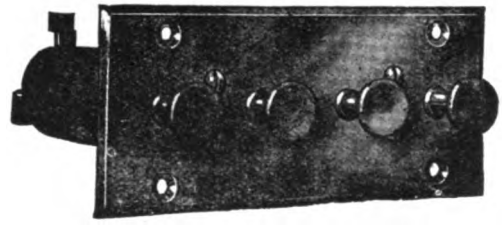
One switch for all lights, individual switches for each, or any choice of functions, individual or in combination.

HEADLIGHTS
The use of resistance for dimming the use of double filament bulbs, or the use of large or small bulbs.

HEAD, SIDE AND TAIL LIGHTS
Head and tail lamps on and off together. Side and tail lamps on and off together.

DASH LAMP
Individually or in conjunction with tail light. These are the principal functions of our standard switches but these by no means indicate the limits of control to which we are confined. Every practical arrangement has its switch.

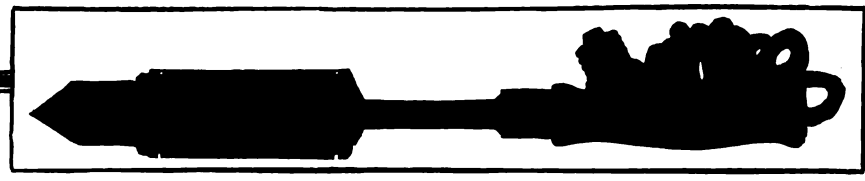
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ARE MADE WITH THE FAMOUS

"NO-BURN OUT" VEA HEATING ELEMENT

HEAT QUICKEST—RETAIN HEAT LONGEST

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ON AIRPLANES BATTLESHIPS ARMY TRUCKS

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Manufactured Under Patent No. 1,000,902

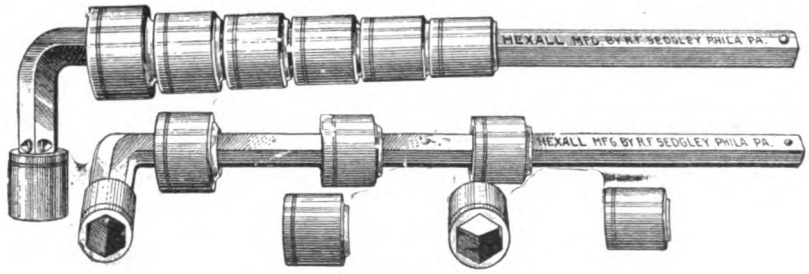
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10" Handle made from ½ inch Hexagon Steel, 7 Hexagon Sockets, with same range as No. 2 set.

Sockets pack neatly on the handle when not in use. Friction Ball prevents them from falling off. Can be used as an extension with wrench on short end.

Weight 21 ozs.

"Break any Sedgley Wrench and we repair it—no charge."

Send for new catalogue.

R. F. SEDGLEY

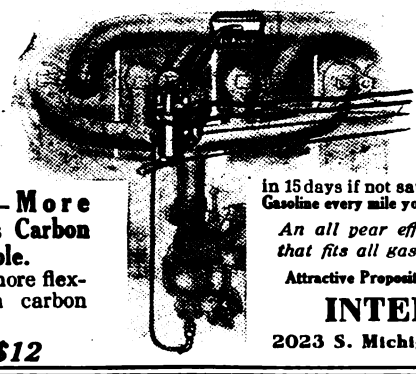
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Instant Heating Unit That Eliminates Cold Engine Troubles

A combination Heating Unit comprising Moistener, ElectricSuper-Heater Primer, Exhaust Super-Heater and Accelerator.



Starts a cold engine instantly.

Increased satisfaction in the operation of your car with a saving of 25 to 60 per cent per gallon. Money back in 15 days if not satisfactory. Saves Gasoline every mile you travel.

An all pear efficiency device that fits all gasoline engines.

Attractive Proposition for dealers.

More Power—More Mileage—Less Carbon—Less Trouble.

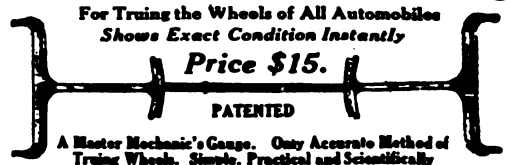
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Perfection Wheel Truing Gauge

For Truing the Wheels of All Automobiles

Shows Exact Condition Instantly



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A Master Mechanic's Gauge. Only Accurate Method of Truing Wheels. Simple, Practical and Scientifically Perfect. Will last a Life Time. All Metal Construction.

Save Your Tires

Keep Your Wheels in Alignment.

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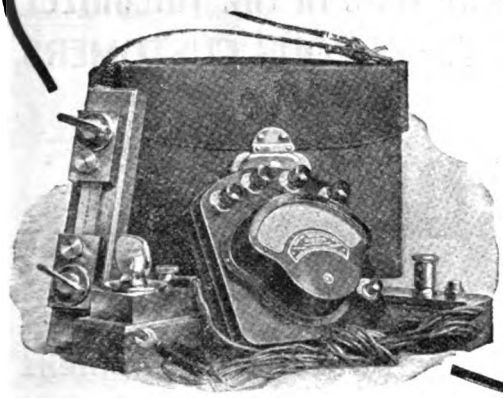
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Model 280

Weston GARAGE TESTING INSTRUMENT

is your one great and urgent necessity, to enable you to locate electrical troubles quickly and apply the proper treatment to remedy them. Its possession will place you a long way ahead of your competitor not so equipped. This instrument is extremely accurate, durable and serviceable. It is the most practical electrical equipment you can install.

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When You Can Obtain Far Better Results With

Permatex Gasket Cement

Produces a pressure-tight union that is gasoline, kerosene, oil and water proof and has a heat resistance five times that of shellac.

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2-oz. Swab Bottles, 20c each ¼-pt. Cans, 30c each 1-pt. Cans, 90c each
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GUARANTEED MAGNETO PARTS



For All Makes of Magnetos, Coils, Starters and Generators

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They represent character in design, in finish, in quality of material, workmanship and mechanical excellence.

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For Sale By Supply Houses

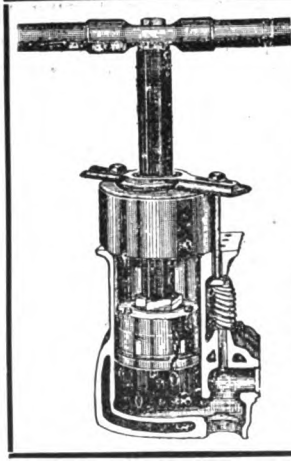
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Repairs leaks in water jackets, boilers, tanks, screw-thread joints, flanged joints, etc., also for keeping nuts and bolts tight. Expands and contracts with the metal to which it is applied and not affected by heat, cold, water, gasoline or oil.

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Make More Profits

BY USING

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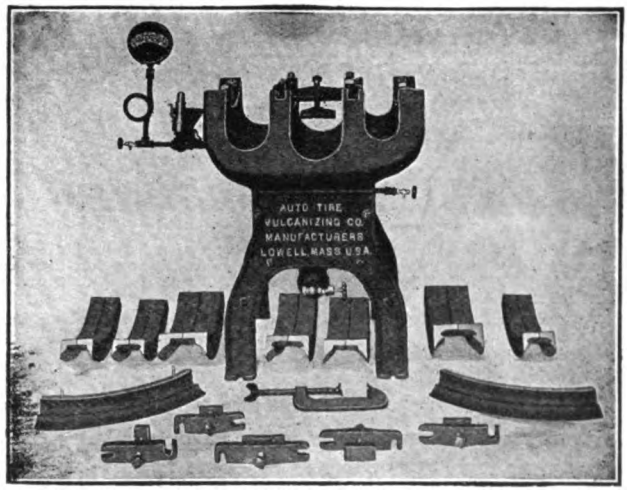
The most practical machine for any type of motor. SIMPLE, SPEEDY, ACCURATE and RELIABLE for hand or power. No shop complete without one. In daily use in all parts of U. S. A. and foreign countries.

Shortage of new cars make it indispensable in large and small shops. We furnish machines of varied capacities from 2⅝" up. Also special Ford Machine. For sale by leading jobbers. Oversize pistons for all makes of motors.

For further information write

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Exceptionally Large Profits can be made by Repair and Garage Men with

No. 8 Lowell Adjustable Sectional Vulcanizer

It's different, superior, economical in operation, in fact beyond comparison.

Complete and thorough work can be accomplished with this vulcanizer at all times.

DON'T LOSE A MINUTE—WRITE TODAY!

Auto-Tire Vulcanizing Company,
140 Powell Street - - - Lowell, Mass.

Leave Your Tube in the Vulcanizer
AND WAIT ON YOUR CUSTOMERS
Why Not?

AMERICAN AKRON

Famous Five-Minute Cure Cement

WILL CURE IN FIVE MINUTES

Will Not Overcure, If Left in the Heat for One Hour

Put Up in Seven Size Containers
Made in Two Grades—Red and Gray
Recommended for Both Casing and Tube Repairs

IF YOUR VULCANIZER IS YOUR BOSS, DECLARE YOUR INDEPENDENCE TODAY

Write for Prices

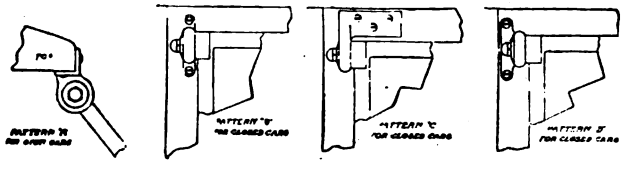
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This accessory is a great seller because it makes driving safer and more comfortable by modifying light reflections and keeping rain, snow or sleet from cutting off the view of the road. It is made of excellent plate glass with quality mountings, fastens to the front bow of the top and is adjustable to any desired angle—also made for coupes, limousines, winter tops, etc.



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JOSEPH N. SMITH & COMPANY
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"WHITNEY"
COTTER TYPE
TRANSMISSION CHAIN

For Motor Trucks and Tractors

No other Detachable Type Approaches the "Whitney" in Popularity.



Our years of experience in chain making, our selection of only the best materials, our special processes of manufacture, and our rigid system of inspection, all combine to make "Whitney" chains the leaders in their line.

Convenience
Durability
Strength
Accuracy
Economy
Reputation

THE WHITNEY MFG. CO., Hartford, Conn.
Chains Keys and Cutters Hand Milling Machines

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THE Fisher PATENTED "RIM-GRIP" SUB-CASING

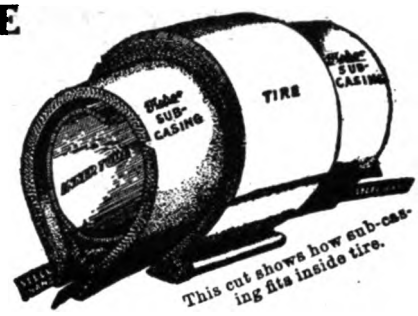
MORE MILES PER TIRE LESS TIRES TO BUY

THE BLOWS THAT YOUR TIRES RECEIVE, WHEN YOU STRIKE OBJECTS IN THE ROAD, LEAVE WEAKENED PLACES IN THE FABRIC.

A TIRE IS AS STRONG AS ITS WEAKEST PLACE

These weakened places are hard to detect now, but will result in blow-outs later.

RIM-GRIP SUB-CASINGS reinforce the fabric of the tire at all points from bead to bead. They make a partially worn tire stronger than it ever was. It can be worn out completely and the sub-casing used in another tire. As the cost of equipping a car with new tires is much greater than last year, it will pay you to investigate Rim-Grip Sub-Casings. *Write for particulars.*



This cut shows how sub-casing fits inside tire.

FISHER MANUFACTURING CO.

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"IDEAL" Lawn Mower Grinder

BIG MONEY-MAKER. Many of our customers make $300 in one season.
You can do as well.

PATENTED
Dec. 29, 1908
Mar. 1, 1910



"You Grind it as you find it."

Grinds all kinds of Mowers perfectly in 15 minutes without removing wheels, ratchets or reel-knife, BETTER, QUICKER and EASIER than it can be done by hand. Has perfect Skate Sharpener Attachment. Run by hand or power. Nearly 10,000 in use. Sold on easy-payment terms. Also makers of the "Peerless" Horsemower Grinder.

WRITE TODAY for catalog and full information.

THE ROOT-HEATH MFG. CO., PLYMOUTH, OHIO

BRAENDER

"The Tyre to Tie To"

The durable wear-resisting qualities built into them combined with the manufacturer's knowledge of the motoring public's requirements produces the tough tread and strong sidewall

BRAENDER TIRES



BRAENDER Red & Gray Tubes

are equal in wear-resisting qualities to Braender Tires.

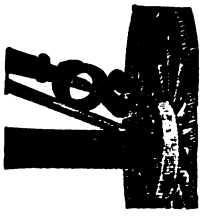
Since the beginning of their manufacture nearly seven years ago, **Braender Tires** and **Tubes** have always given complete satisfaction to the user and dealer.

Write or wire for our proposition.

BRAENDER RUBBER & TIRE CO.
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Twin Spring
SHOCK ABSORBER
BEST BY TEST
For Ford, Maxwell, Studebaker, Pierce Arrow and All Cars.
Write for Agents Proposition and Prices
TWIN SPRING CO.,
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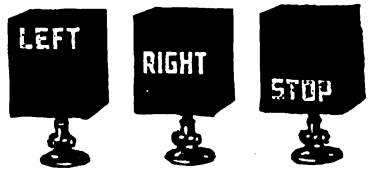
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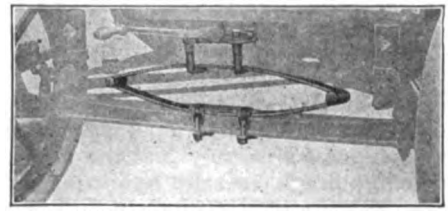
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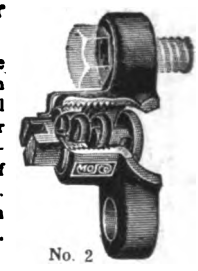
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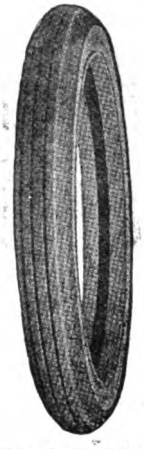
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37 x 5	36.95	73.90	39.73	79.45



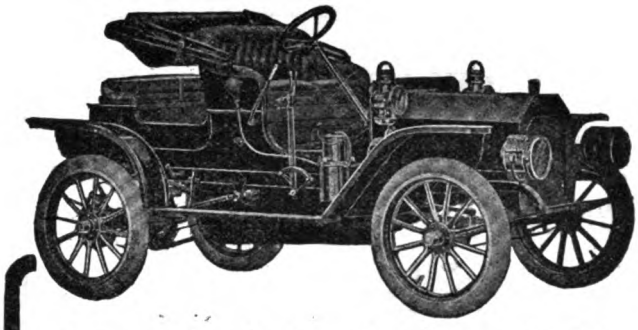
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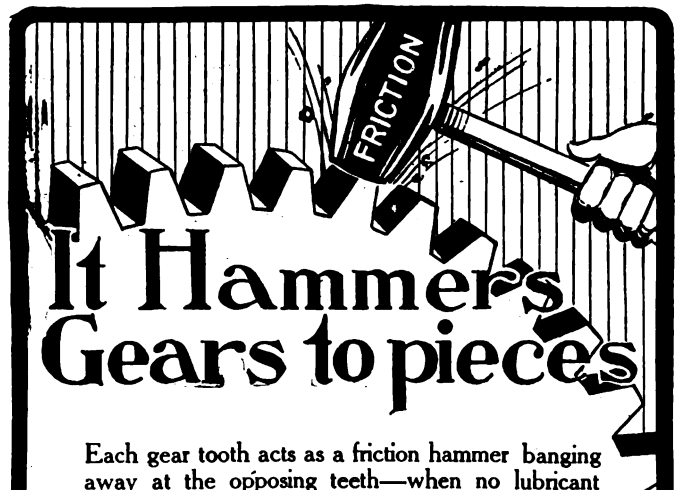
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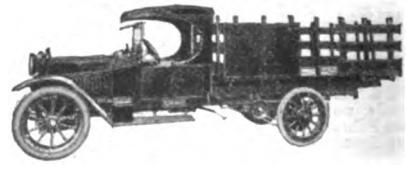
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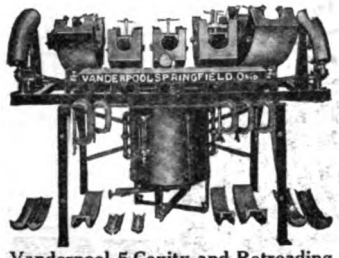
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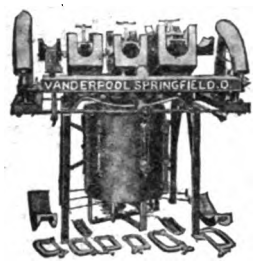
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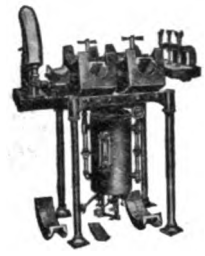
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A JOURNAL OF PRACTICAL MOTORING

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VOL. XXV. No. 2. NEW YORK, APRIL, 1918. PRICE {10c. PER COPY / $1.00 PER YEAR

Overhauling the Automobile to Put It Into Condition for the Coming Season

Dealing with the Overhaul of the Electrical System, the Ignition Units, the Methods Used for Timing and the Disassembly of the Clutch

In our March number we took up the removal of the engine and its overhaul, giving special attention to the pistons, cylinders, and the lubricating system and covered much of the overhaul as far as the engine units were concerned. The amateur repair man should not try to overhaul the electrical system in so far as the generator and motor starter are concerned. He should try to remove these units without disturbing them and if there are any regulating devices such as voltage regulators, or generator cut-outs, he should remove these very carefully, so as not to disturb the setting. All repairs to the electrical system should be made by experienced electricians or those accustomed to this sort of work. The magneto in some cases may be repaired by the amateur, but as a general rule this unit should be repaired at the factory, or by an experienced man. Practically the only part of the magneto that ordinarily requires repair work are the breaker points. These often wear into rough ridges, or are burned so that they do not make proper contact. Wherever possible the breaker points should be flattened with a very fine piece of emery cloth or a file, so that they contact across their full face.

After they are replaced they should be so arranged as to separate about .002 when the arm rides on the hill of the cam. In putting the magneto back on the engine, the breaker points must be timed so that they will snap apart at the proper moment, or the engine will not function properly.

Magneto Setting.

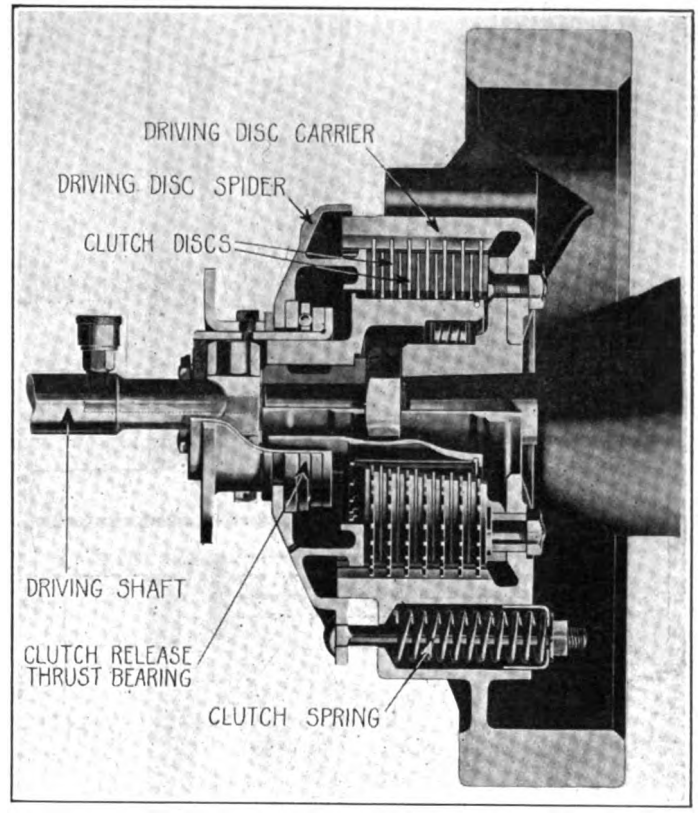
A good rule to follow in setting a magneto, which is fitted with a fixed spark, is to mesh the magneto gears so that the spark will occur at dead top center of the explosion stroke. This setting gives the maximum possible advance and does not result in a back fire or kick of the engine. In setting a magneto which has a spark advancing mechanism, the spark advance should be fully retarded and the breaker points set so as to separate at dead top center of the explosion stroke. This gives one the opportunity for advancing the spark the full range of the mechanism.

Battery Systems.

Cars equipped with battery ignition systems or coil systems, but not magnetos, are usually fitted with some sort of a combined breaker and distributor box, which very much resemble the magneto parts with the same name.

Systems of this type as a general rule are set in the same way that the magneto is timed, as regards spark advance and retardation. That is, the breaker points should separate at, or very shortly after, top center, with the spark fully retarded.

Most of these devices are so arranged that the gears may be meshed and the timing altered, either through a coupling between the driving gear and the timer, or in the breaker box cam itself.



Sectional View of Reo Disc Clutch Showing Principal Parts Referred to in Text.

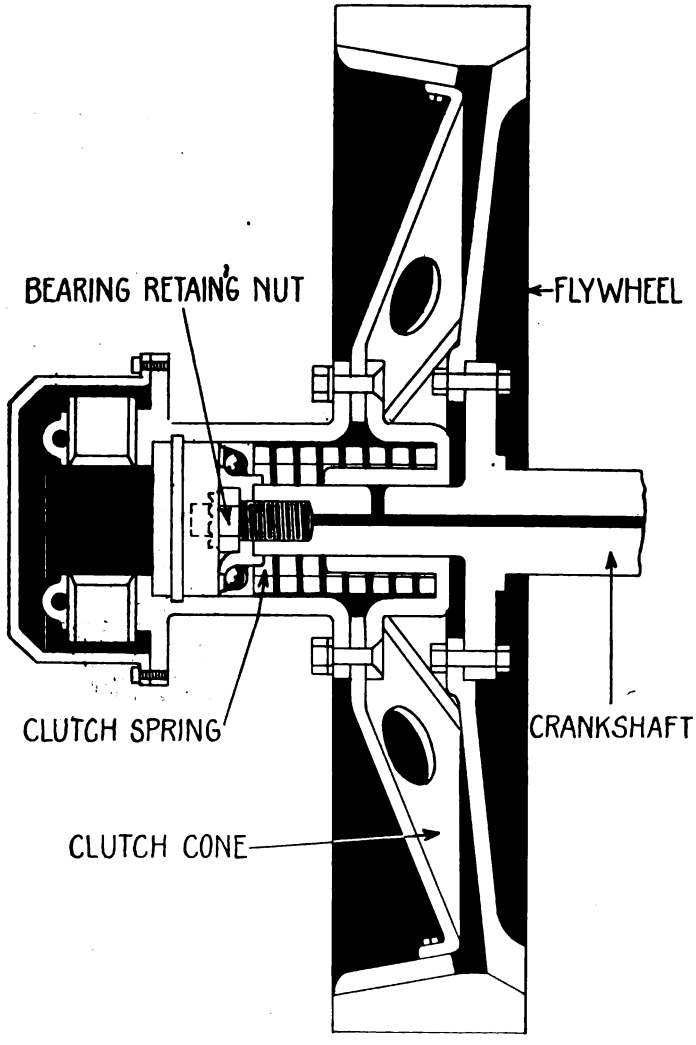
In caring for magneto or battery breaker boxes and distributor units, one should use only the best lubricating oil and very little of it. The oil should be smeared upon the breaker cam with the fingers, in a very thin coating. The distributor should never be oiled, but greased, unless otherwise directed, with an extremely small amount of pure vaseline. The vaseline should be rubbed on the metal bars and all surplus wiped off with a clean cloth.

There are two general classes of carburetors on

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the market, the first having a fuel and air inlet controlled by outside setting and the second having a set fuel nozzle, which cannot be altered by any hand adjustment. In either case when overhauling the engine the carburetor should be taken from the car and thoroughly cleaned. The float bowl or cover should be taken off and all of the small passages cleaned with a fine wire, being very careful not to scratch any of the valve seats. In cases where a carburetor is fitted with outside adjusting devices, one should carefully make note of the adjustment positions, just how many turns are given the gasoline needle valve and just how many turns the air adjustment is opened or closed. If this is done one will have very little trouble in readjusting the carburetor.

In readjusting the carburetor, if one does not remember just how the outside adjustments were set, one should cut off most of the air entering, and open the needle valve about one and one-half turns, then try to start the engine. If the engine will not start under this adjustment the carburetor should be examined and if there are evidences of an oversupply of gasoline, the air adjustment should be opened so as to allow more entering air, or the needle valve closed to one turn. The action of the engine when starting



Sectional View of Typical Cone Clutch. The Removal of the Bearing Retaining Nut Permits the Disassembling of the Unit.

is an indication of the proper carburetor setting. If the engine acts "logy" or sluggish it is an evidence of an oversupply of gasoline, and the gasoline should be turned off very slightly until the engine accelerates readily with the opening of the throttle.

Adjusting the Carburetor.

In making an adjustment of this kind, the spark advance, that is, if the engine is fitted with such a device, should be advanced about half way on the quadrant. If the carburetor is fitted with two adjustments, a low speed and a high speed, the low speed adjustment should be made first and the engine should run at 200 turns per minute or less without missing fire.

In every case adjustment should be made as closely as possible, that is, the engine should be run at a certain speed and the gasoline turned off slowly until the engine speed decreases. This is the only way to get maximum efficiency.

After the tentative, or first adjustment has been made, the engine should be run until it is warmed thoroughly and the adjustments all made over again, for a cold engine cannot be adjusted to give any degree of satisfaction.

The Transmission.

We now come to the second most important part of the car, the transmission section, consisting of the clutch, the gear-set and the rear axle. The methods of overhaul of these three units vary greatly according to the type of units used. Where a garage is fitted with a device for lifting, or where one may obtain sufficient assistance, the engine clutch and gear-set, if in unit, may be removed from the chassis at the same time. Most of the cars on the market are so designed that the engine and clutch, which is usually located in the flywheel, may be removed as one unit, leaving the heavy gear-set separate in the car itself, or supported on a box or block.

Clutch Types.

There are two general types of clutches, the disc and cone. Of the two types, the cone is perhaps the simplest and is removed the easiest, and so we will consider this type first. In the cone, the flywheel usually forms the outside of the unit, while the inside or cone forms a second part, and is firmly attached or keyed to the driving shaft or gear which drives the gear-set.

Cone clutches may be divided into two classes, those which are operated by a large coil spring at the center and those which are operated by small coil springs placed upon the circumference or web of the clutch itself. Those which are fitted with a large spring at the center are, as a rule, retained on the crank shaft by a lock ring or a large nut. In the former case the lock ring may be detached from the crank shaft and the clutch arm slipped out, taking with it the large coil spring which must be removed under a heavy press or in a large vise. Under no condition should the clutch unit be disassembled on an open bench, for in this case the many hundreds of pounds pressure contained in the compressed spring would result in injury to the repair man, were he to release it suddenly. Should one find that the clutch spider is retained on the crank shaft by a large nut, he should observe great care before removing the nut for he will be apt to release the spring and be badly injured. Clutches of this type can only be disassembled with proper tools.

Clutches of the Second Type.

Where the clutch pressure is obtained by small springs placed on the periphery or web the smaller

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springs may be removed one at a time, by the use of a Y bar, using a piece of bent iron or a rope as a fulcrum. The smaller springs do not have the expansive power that the larger one does and can be removed easily by the amateur. After the spring or springs are removed the clutch may be entirely disassembled and the fabric facing examined.

Clean the Fabric.

This fabric should first be cleaned thoroughly by the application of kerosene and the liberal use of a stiff scrubbing brush. This will remove all of the oil which may have accumulated, and one may then be able to see the condition of the fabric. Should the fabric appear worn, it should be replaced with new. New fabrics may usually be obtained at the service station and in replacing fabrics one should be extremely careful to sink the rivet heads below the surface of the fabric, or uneven clutch action will be the result. If the old fabric is to be used again, it should be cleaned as above directed, and if it is leather, softened by the application of neatsfoot oil, not lubricating oil.

With the clutch removed from the flywheel a careful examination should be made of the flywheel fastenings and if this member is riveted to the crank shaft flange, the rivets should be tightened if necessary for it is vitally essential that the flywheel be fastened firmly to the crank shaft.

Disc Clutches.

Clutches of the second-class, that is of the disc type, are divided into the same two classes as those of the cone type in so far as the coil springs are concerned. The clutch used on the Reo car is illustrated herewith, and has the springs placed at equal distances in the clutch drum. As a general rule disc clutches may be removed as an assembly from the flywheel by the removal of the large nut on the end of the crank shaft. The clutch assembly may then be disassembled by the removal of the smaller retaining nuts, which hold the springs, and the nuts on the ends of the studs which hold the so-called clutch spider into place. As cautioned in the cone clutch type directions, one should never remove the large center coil springs except beneath an arbor press. Disc clutches are usually faced with some sort of fabric which may be cleaned in the same manner as directed for the cleaning of cone fabrics and the same directions apply.

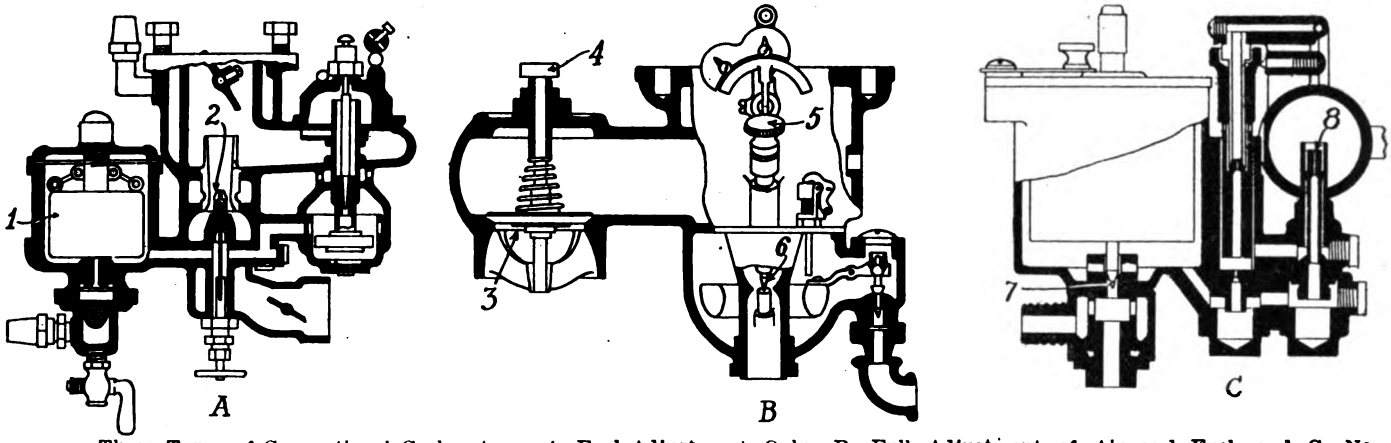
An important part of the clutch is the release thrust bearing usually of the ball type having two heavy thrust washers. This bearing should always be examined for wear and in event of excess wearing of the thrust washers, should be replaced with new, for unless this is done, sooner or later one will have considerable trouble in releasing the clutch. Wherever any grease or oil channels occur, they should be cleaned carefully with fine wire and liberal applications of kerosene oil.

Before assembling the clutch unit, all of the bearings should be tried in their respective places and the fit noted. It is essential that there is but very little play in the clutch, for if there is, the continued racking of loose parts will very shortly damage the mechanism. Bearing side play may be remedied by the replacement of the sleeves with new or the fitting of new bearings. End play may be compensated for by the insertion of bronze or steel washers of the required thickness.

A common cause for trouble in a multiple disc clutch can be traced to the sticking or catching of the disc in the slots or on the keys which transmit the power to the discs. Each clutch disc should be tried in its place before assembling the whole and the clearance between the keyways and keys noted. If the slots are all smooth and the fit is true, the clutch will probably give satisfaction. If, however, there is too much play between the discs and the carriers, at every clutch engagement the plates will receive considerable wracking, and will soon wear out.

The bolts, with which the assembly is bolted to the flywheel should be absolutely tight and permit no play between the parts. In event of any play, the bolts should be replaced with those of a size larger and the holes reamed to fit.

Where clutch members are keyed to the shafts, keyways and keys should be examined for wear and new or larger keys put into the clutch in place of those worn.



Three Types of Conventional Carburetors. A, Fuel Adjustment Only; B, Full Adjustment of Air and Fuel, and C, No Adjustments. Number of Parts as Follows—1, Float; 2, Needle Valve; 3, Auxiliary Air Valve; 4, Air Valve Adjustment; 5, Needle Valve Adjustment; 6, Needle Valve; 7, Float Valve; 8, Fuel Nozzle.

Baker Electric Advances in Price.

The Baker R. & L. Company announces an advance in price of their Brougham type of car of $150 and their Coach type $200, making a total cost of the first of $3,150 and the second $3,400.

In making this advance the Baker R. & L. manufacturers call attention to the fact that despite the increase in the cost of materials and the increased prices of labor, they have kept their prices uniform for the past ten months.

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Billions of Barrels of Oil Locked Up In Oil Shale

A Discovery Which Has Disclosed One of the Country's Greatest Mineral Resources of Crude Oil, Gasoline and Ammonia

BY GUY ELLIOTT MITCHELL
Of the United States Geological Survey

Unfortunately the discovery of the immense oil resources of America, contained in its oil shale deposits, will doubtless be attended by misfortune for the unwary—those who invest carelessly in the stock of fake "wild-cat" oil companies, organized by get-rich-quick schemers who are intent upon exploiting the gullible public rather than the development of oil-shale properties. Such schemers, like camp-followers, appear in the wake of every great discovery of mineral wealth, and they have always found the "oil fields" a particularly lucrative one for their operations.

Is the United States facing a gasoline famine? Shall we be required to forego automobiling except to meet the stern necessities of war and of utilitarian traffic? Are our petroleum fields showing signs of exhaustion?

The output of petroleum has not yet begun to diminish; statistics show that it is still increasing; yet the downward trend of production from the present oil fields is plainly in sight.

The war has made a sudden and enormously increasing demand on the oil fields of America, and though the industry has never been so feverishly active as it is now and the output never so large, the truth is that the demand has not been entirely met. And during the next year and as long as the war lasts, the demand will be ever increasing, ever more pressing.

Many of the host of larger vessels that we are now building will be equipped with oil burning furnaces, and the vast swarm of airplanes that we are building, as well as the thousands of war automobiles and trucks that we are turning out, will consume an enormous quantity of gasoline. Yet no great new oil regions comparable with the mid-continent or California fields are being discovered, and it is questionable whether any will be, for our oil geologists have pretty thoroughly combed the accessible oil areas. What, then, is the answer?

It is just at this juncture that we have made a discovery that has disclosed what is, undoubtedly, one of our greatest mineral resources—one that should supply the needs of the war, and that for generations to come will enable the United States to maintain its supremacy over the rest of the world as a producer of crude oil and gasoline and incidentally of ammonia as a highly valuable by-product. We have discovered that we possess mountain ranges of rock that will yield billions of barrels of oil.

For many years travelers going west through the Grand River Valley of Colorado and into the great Uinta Basin of eastern Utah have looked from the windows of their Pullman cars on the farstretching miles and miles of the Book Cliff Mountains, little realizing that in these and adjoining mountains, plainly exposed to view, lay the greatest oil reservoir in the country—the oil shales of Colorado, Utah, Wyoming and Nevada.

Rocks That Burn Freely.

These shales, it is true, were known to yield oil. Campers and hunters in building fires against pieces of the rock had been surprised to find that they ignited and burned. This fact was looked upon, however, as only another of the natural curiosities of the great West, and investigation showed that little or no attention was paid to it because of the seemingly inexhaustible pools of crude petroleum found elsewhere under great areas.

In connection with its investigations of the undeveloped mineral resources of the country the United States Geological Survey has recently made special studies and tests of these oil rocks and has brought to light two important facts: First, that our western shales are phenomenally rich in oil; and, second, that in foreign countries, particularly Scotland, much inferior shales are today successfully mined and worked as a source of oil and other commercial products. The industry in Scotland is 70 years old and is still in a highly flourishing condition.

Oil Profitably Distilled From Shale in Scotland.

The Scotch shales run only about 25 gallons of oil to the ton; yet the principal operating companies competing with the petroleum industry pay annual dividends, averaging 18 per cent. Rock producing even as low as 20 gallons of oil a ton is yielding good dividends. The shales in the western United States are far richer in oil than those of Scotland. Many tests made by the Geological Survey show that the American rocks contain 40 to 50 gallons to the ton and those in one deposit tested 90 gallons, or more than two barrels to the ton.

To extract the oil, the rock is distilled at a low temperature. So simple is the process that the geologists who surveyed the fields carried small testing retorts around from place to place to determine the oil content of various specimens.

In the Scotch plants the rock is heated in retorts arranged in banks of four over a single fire-box, and a unique feature of the process is that the gas derived from the shale is the fuel, used for obtaining the oil and other products. The retorts are grouped in benches of 64 and each retort reduces 4 tons of rock a day. Some 3,000,000 tons are treated annually. The vapors pass from the retorts into condensers in which the crude oil is deposited, and then on into a chamber in which the ammonia is collected.

Quantity of Oil in American Shales Enormous.

The total production of petroleum in the United States up to 1918 has been 4,255,000,000 barrels, and the possible future production, or the total reserve in the ground—and some of it lies very deep—is estimated by the Federal Government at about 7,000,000,000 barrels.

How does this petroleum compare with the known

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oil-shale reserve? The quantity of oil that can be extracted from the shale is so huge that the petroleum reserve becomes almost insignificant by comparison. As a result of only a partial investigation, it is estimated that the oil in the shale ranges of Colorado alone amounts to 20,000,000,000 barrels. There are mountains—indeed, ranges of mountains—which for many miles carry thick beds of rock that yield 30 to 50 barrels of oil to the ton.

More recently the state geologist of Colorado has reported that in northwestern Colorado beds of commercially workable rock that average more than 20 feet in thickness and that will yield at least 36 gallons of oil to the ton are found in an area extending over 1,500 square miles. These figures show a content of 24,000,000 barrels of oil to the square mile or a total of 36,000,000,000 barrels for the area. Either twenty billion or thirty-six billion is sufficiently impressive.

The Geological Survey also estimates that 300,000,000 tons of sulphate of ammonia, worth, at before-the-war-prices, about $60 a ton, could be recovered as a by-product in the extraction of the oil. This by-product would be sufficient to enrich most of the farms in the great Mississippi Valley.

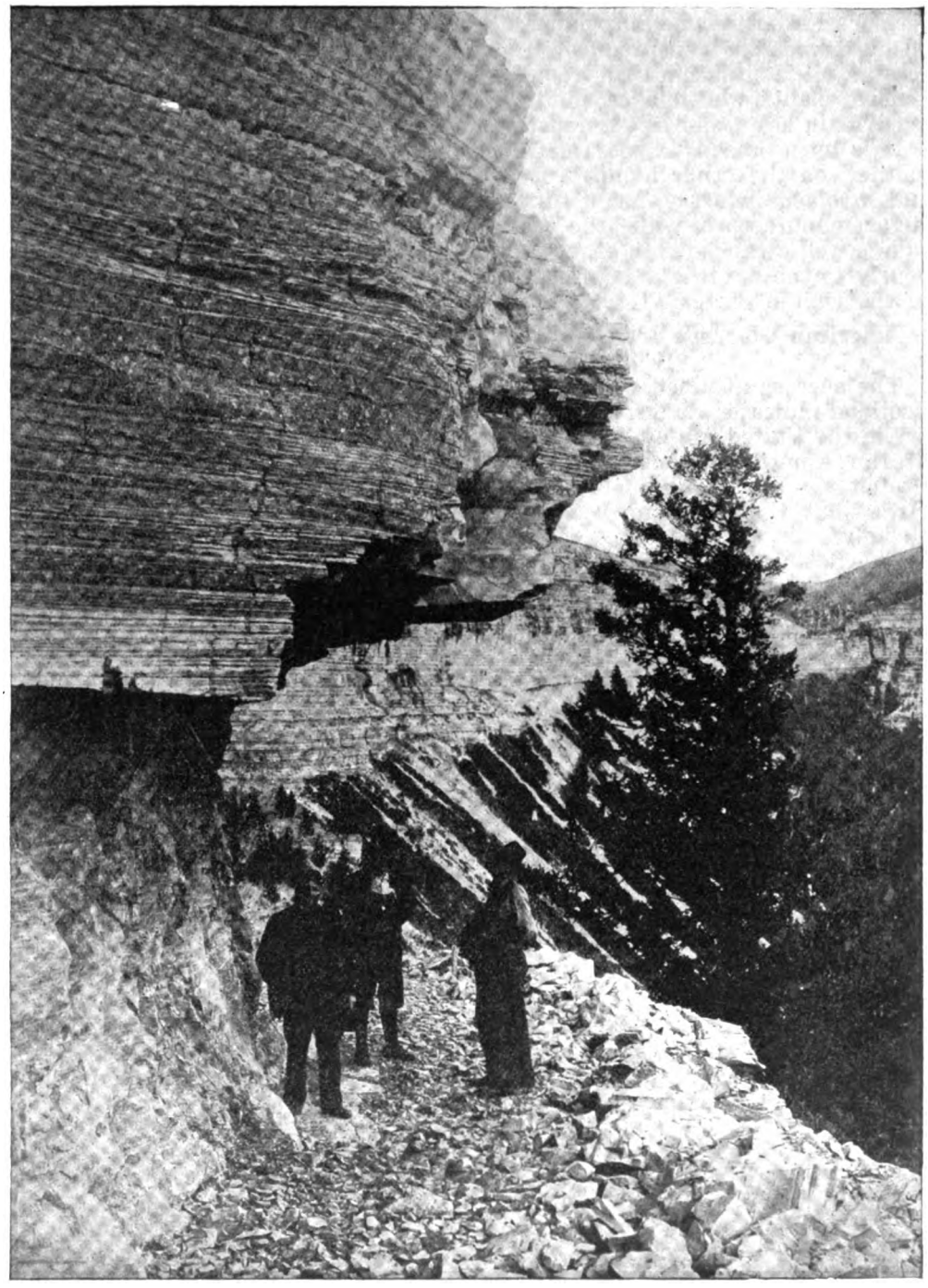
In addition to the oil rock in Colorado, that of Utah must be considered. The Government is now investigating these deposits in detail and has already stated that they are probably as extensive as those in Colorado and are equally rich in oil. Oil shales have been examined also in Nevada, Wyoming, California, Montana, and other States. Tests of specimens from Wyoming show from 30 to 50 gallons to the ton, and samples from Nevada have produced from 40 to 100 gallons of oil to the ton. One 10-ft. bed in Nevada yielded oil at the rate of 13,000,000 barrels to the square mile.

But the West has no monopoly of the oil-shale resources. Deposits have been examined by the government in Illinois, Kentucky, Ohio, Pennsylvania, Tennessee, West Virginia, and Indiana, some of them testing out with a high oil content. An examination of the black shale of southwestern Indiana shows that it underlies about 16,000 square miles, and although the oil content of much of it is less than that of the western shales, and some of it is too low in oil to be worked commercially, the actual content for the area in Indiana alone would be 100,000,000,000 barrels.

Some of the eastern shale that is very rich in oil overlies extensive coal beds, which are being mined by the "stripping" method, so that the oil rock must be removed in any event to get out the coal. This shale could, therefore, be mined by steam-shovels without additional cost, as it is a necessary preliminary to the coal-mining.

The potential value of this immense oil resource of America is almost beyond comprehension. Enough oil is held in these natural reservoirs to fill many times over every tank, cask, barrel, can, and other container of every kind in the world.

Until recently the oil shales of the United States,



Rich Oil Shale Ledge Outcropping near Grand Valley, Colo

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particularly those of the Western States, have been referred to by the government geologists as a reserve available for extraction whenever the demand and the price shall become great enough to warrant the establishment of a new industry to supplement the supply of petroleum from the oil fields. This time is now at hand.

The extraordinary demands of the war are already indicating the approaching insufficiency of the output from our petroleum fields, and experiments in the utilization of oil shale are already being made in Colorado. Plants are being erected, oil is being distilled, processes are being tested and a steadily increasing output is soon to be expected. So substantial is this resource considered that the government has set aside as a special reserve for the American Navy 132,000 acres of the richest oil-shale land in the West.

It is not to be understood, of course, that any farmer or rancher who may happen to have oil shale on his homestead can produce oil at a profit. Successful oil distillation will require large and expensive plants well financed and scientifically managed, as in any other large industry.

It is by no means a poor man's proposition; but neither, on the other hand, is it a highly complex and involved industry, such, for instance, as beet-sugar manufacture, while the fact that oil distillation is well established in other countries is tremendously to the advantage of prospective development in the United States.

American Oil-Shale Industry Will Far Outstrip Scotland.

The success attained by the oil-shale industry in Scotland indicates far greater success for the industry in the United States. Not only is the oil content of the American deposit larger than that of the Scotch—in some cases more than three times as large—but the American rock can be mined more cheaply.

The Scotch shales lie far below the surface and must be mined by hand and hoisted through shafts like coal or hauled up inclines. Most of the Rocky Mountain shale lies from a few feet to 2,500 feet above the valley floors, and much of it can be mined in a wholesale manner by steam-shovels and lowered by gravity to the reducing plants.

Oil Formerly Distilled From Shale in Pennsylvania and Utah.

The Scotch shales occur in irregular beds which here and there thin out and have been thrown into geological faults and folds that greatly increase the cost of mining. The western shales, on the other hand, are more uniform in thickness and lie in a horizontal position. Despite their handicaps, the Scotch deposits are worked at a large profit, yet their average content of oil is only about 25 gallons to the ton, whereas vast quantities of easily mined American shales that lie in benches 6 to 10 feet thick will average perhaps a hundred per cent. more oil.

Oil-shale distillation is not new in the United States; yet it is doubtful if there are many people alive who remember anything about the earlier industry. Before petroleum was discovered in Pennsylvania, about 50 small companies in the eastern United States were crudely distilling oil from shales; but after subterranean pools were discovered these companies went out of business.

Long ago the Mormons also distilled oil from shale near Juab, Utah, where the ruins of an old still can yet be seen. We are now about to return to this discarded industry and produce hundreds of millions of barrels of oil where formerly the output was comparable to the production of oil from sperm whales.

America's Immense Mineral Wealth.

The discovery of these vast deposits of oil-bearing rock in the United States, the petroleum content of which can be estimated in nothing less than hundreds of billions of barrels, is one more evidence of the abounding wealth of the North American Continent. No sooner does one of our resources show limitations in production and the pessimists begin to cry, "What shall we do when our reserve is gone?" than immense additional deposits or satisfactory substitutes are discovered.

During the last few years petroleum, with its most valuable constituent, gasoline, has become one of our most vital resources, so that even the most cheerful optimist might well begin to question the immediate future prospects of the industry; but with thousands of square miles of rock lying above ground, within sight of trunk-line railroads and constituting an unfailing oil reservoir, we can feel assured of a supply of gasoline for many generations to come.

The United States is indeed a country blessed by a generous Providence. Germany, to supplement its stock of petroleum and gasoline, laboriously raises potatoes from which to distil fuel alcohol; but here in America there are mountains of oil rock which can be blasted and steam-shoveled and transported by gravity to great retorts, which will turn out oil and fertilizer in limitless quantities.

The production of oil in this country, instead of decreasing, will continue to grow; it will even, because of the shale resource, greatly increase its present immense output of 340,000,000 barrels a year and will keep pace with the enormously increasing demand. No one may be bold enough to foretell what tremendous figure of production may be reached within the next ten years.

From National Geographic Magazine, Washington, D. C.—Copyright 1918—By Special Permission.

The discovery of this new source of oil will doubtless result in the formation of many "fake" oil companies, organized for the purpose of robbing the public. For this reason our readers are warned against such fraudulent organizations. Anyone who intends investing funds in oil-shale corporations should investigate fully the companies and their promoters. —Ed.

Long Distance Haulage.

A new enterprise has just been inaugurated by the New York and Philadelphia Auto Trucking Company which bids fair to be an excellent business proposition. We speak of the truck service between New York and Philadelphia.

At the present time this company is running a fleet of five-ton Pierce Arrow motor trucks between the two cities mentioned, the trucks leaving at both ends every day, and carrying goods of practically any size, shape and weight. Freight received at any of the truck company's receiving stations before five p. m. is delivered the following day, under ordinary conditions.

Unquestionably such service will be of great value to merchants at both of these cities, who are at present troubled by the existing freight conditions.

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How to Place and Distribute Advertising So That It Will Give Results

1—The Reason for Advertising and Its Relation to Successful Business as Contrasted With Dust and Cobwebs in a Side Street Garage

BY FRANK A. FARRINGTON

There used to be considerable debating over the question of whether it pays to advertise but there has ceased to be any such question among well informed business men in any line of business and the question is no longer, "Does it pay to advertise?" but "How can I make it pay?"

When you find a merchant who does not believe in advertising, you find an old fogy with windows filled with junk, with cobwebs along the tops of the shelves, and it is more than likely you find this man sitting back at a mussy desk in an idle store, kicking about the hard times and lack of trade.

The automobile business, especially the garage business, is comparatively new. Many men have developed garages, without any advertising. We all know of remarkable successes in the garage line, successes not coupled with any appreciable amount of advertising.

Success Without Advertising.

There are two reasons why garages have been largely successful without advertising. One is that the majority of men going into this business have been men totally without merchandising or retail selling experience. Some have been salesmen and have thus drifted into representing certain automobile manufacturers locally. Many have been mechanics who have seen a chance to develop into employers instead of remaining employees. Owing to this condition there has been a large percentage of garage proprietors who did not know how to go about advertising and so they have not tried it themselves and they have not been forced into it by lively advertising on the part of competitors.

The other reason why garages have not advertised largely, is that the demand for garage work and service has increased so rapidly that a great proportion of garages have had no trouble in getting all they could do, most of the year, without having to hustle for the business.

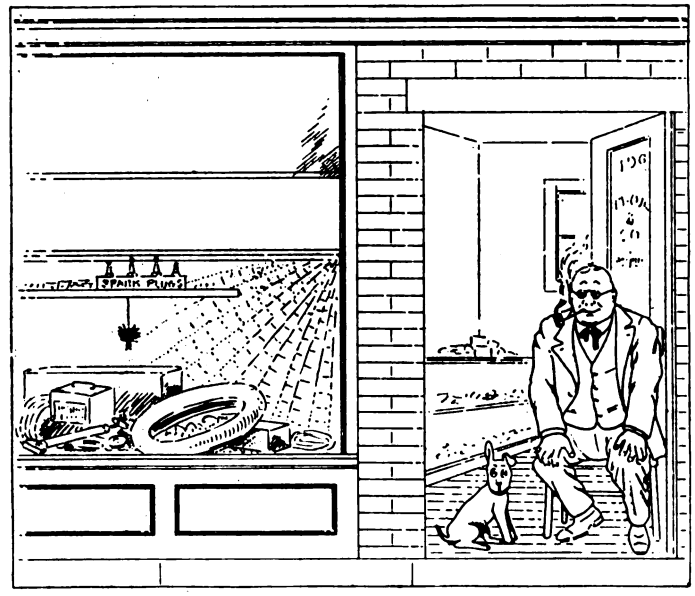
But the man who looks to the past of this business for rules to govern the future will make a fatal mistake if he assumes that advertising is going to remain a negligible factor in the making of success. There begins to be competition in repair work. In some localities too many have opened garages. In other places, capital has financed large garage enterprises with men at the heads of them who know something of the value of advertising. Lack of help may make it possible for shops to run to full capacity during the war, but the war is not going to last forever and the man who succeeds best after the war will be he who begins now to build for that time by giving his business plenty of publicity and extending as much as possible his territory.

In the Accessory Field.

Then, in the accessory field, the situation already has become acute in plenty of places. Accessories are being taken on by stores in the hardware and other fields, stores operated by men who do advertise and who are going to apply to automobile accessories the same advertising methods they have been applying so successfully to other lines.

It amounts to this. If the repair man wants to get the most desirable class of patrons, he will have to advertise, or the advertising garage will get the best class of trade and the non-advertiser will have to take what is left. There may be enough left to keep business good now, but the condition will not last, and anyway, who wants to be the man to get along with what is left over, after the other fellows have taken their choice?

And it amounts to this. The garage owners must



Dust and Spiders Find Good Homes in the Shops of the Men Who Do Not Believe in Advertising.

advertise in the accessory field or the first thing they know, the accessory business will be in the hands of merchants of one class and another.

All this is with refernce to the necessity for advertising. It is saying nothing about the advantage of advertising, even when it is not necessary to the actual life and continuance of the business.

One Should Advertise.

You should advertise, not only to protect your business against the encroachments of others who do advertise, but you should advertise in order to make your business a real success. You may be satisfied as long as you do enough business to make a living. I don't call that being successful. Unless you are able to improve your financial condition materially year by year, you may be getting along but,—you are not succeeding.

You cannot develop your business to anything like its maximum capacity and you cannot come anywhere near taking full advantage of your busi-

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ness opportunities unless you advertise intelligently and persistently.

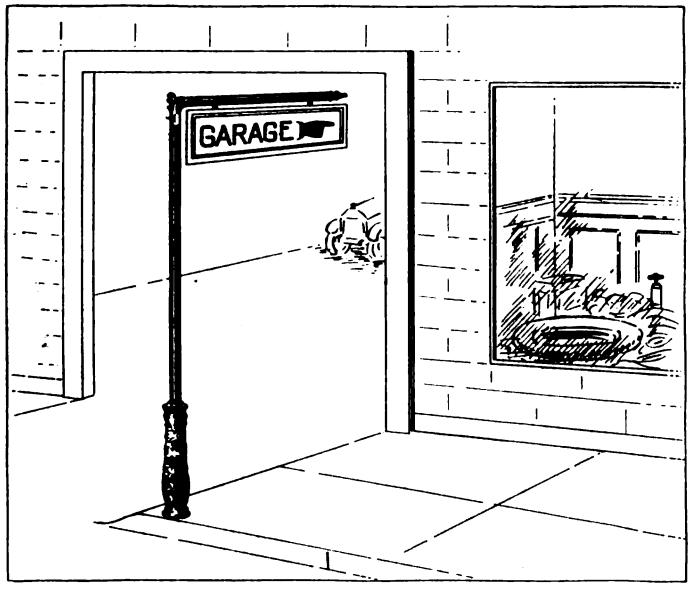
The trouble with doing just enough business to get along comfortably is that as soon as anything happens; sickness, dull times, fire or any of half a dozen business-smashing events; you are up against it. In order to carry on, in spite of reverses, you must have resources. It will take advertising to put your business where it will have enough momentum to take it over the rough spots without coming to a stop.

Obtain Your Share.

If you are going to get your share of the best business in your locality, you must advertise. If you are going to get more than your share and develop a business bigger than some of the others, you must advertise. If you are going to hold your own in the face of competition, that is going to advertise whether you do or not, you must advertise.

It resolves itself into this. If you succeed from now on, without the help of advertising, it will be in spite of that lack, not on account of it. Advertising will produce success when success would otherwise be lacking. Advertising will make of the least success, a success worth while.

So my suggestion is that no more opportunity for growth be wasted by failing to advertise, and that no more time be wasted in considering whether

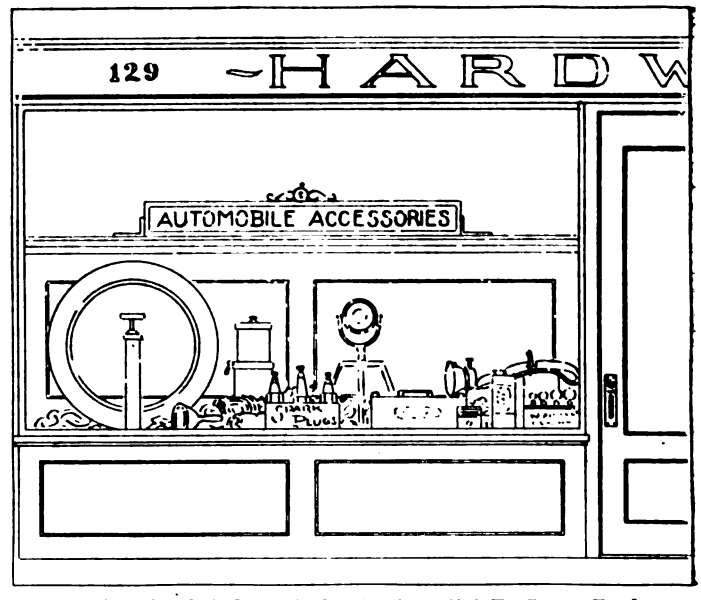


The Sign in Front of Your Garage Shows That You Believe in Advertising.

or not it is worth while to advertise. Let's make up our minds at once that we can't afford not to advertise and let's begin right away to do something along that line.

Whatever you may say you think about advertising, I know you believe in it because you have put a sign out on the street to call attention to your garage, thereby admitting that you don't trust to everybody knowing you are there without being reminded. And you like to see an announcement in the paper saying that you have sold So-and-so a car, or that you have overhauled Somebody's car. You know that such notices bring your garage to the minds of the public and remind them of your business. You have all along believed in advertising that did not cost anything, whether you have admitted a belief in other advertising or not.

In times when it becomes desirable to reduce operating expenses, the man who is not a very firm believer in the value of advertising and who has advertised just because somebody told him it was



An Attractive Window Display Is Essential To Draw Trade.

the thing to do, generally thinks of his advertising expense as the first one to be eliminated. He does not trace definite business to individual advertisements, so he does not see as his advertising pays. He quits advertising to save money. That is just about the same as to cease feeding a child when it gets hungry. Advertising is not a cause of expense, it is a cause of growth.

Very rarely can a dealer see wherein a single advertisement has brought enough returns to pay its cost. Plenty of men have decided that advertising did not pay because, as they have said, "I tried it once and it didn't bring any business." Occasional advertising will not even bring occasional business.

Progressive Advertising.

How far would you get if you went out on the road with a car and tried to proceed on the plan of starting the motor for three or four revolutions at a time and then stopping it each time. You would use up power enough and it would cost enough to have produced results, but would it get you anywhere? On the other hand, if you turn on the motor and let it run, using the power intelligently, you roll along nicely at less cost than the other way which accomplished nothing.

Advertising is like that. It must be kept going regularly and then its effect is cumulative. That is each succeeding advertisement has a greater influence because of those that have appeared before. Certain medicines are cumulative. Arsenic, for example. The longer you take it, the more it accumulates in your system. Every little bit you take, added to what remains in your system, makes a little bit more. Advertising is like that. The longer you advertise, the more value each advertisement has.

Plenty of men have started in to advertise, having made good resolutions, only to lose faith gradually

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in the work because they did not get early results. Well, it is not much of a trick to get discouraged and quit. Anybody can be a quitter in advertising as in other things. Advertising is one of those things that calls for "sticktoitiveness," for hanging right on and trying one's very best all the time.

Human Interest Stuff.

I don't care how little you may know about advertising, you can advertise. Some of the best advertisements ever written have been written by men so inexperienced in that sort of thing that they just went ahead and wrote out in a perfectly natural, human way just what they wanted to say to the public, and the public saw it was not merely stuff made up to fill advertising space, but real messages, and they sat up and took notice.

The good advertisement is not the one with the flossiest language or the most sensational headline or the fanciest type arrangement. It is the one that gets its message over to the reader. Good advertising is merely having something to say and saying it so that people will understand it, and feel an interest in it, if it applies to them in any way.

I would not recommend an advertisement so crude as to be ill spelled or grammatically incorrect, because it might create a distrust of the business behind it, but any man, who can put his message on paper without violating rules of spelling or mixing his grammar too badly, can make up advertisements. And the man who doubts his ability to make his ad correct in those particulars, will find that the printer will correct his mistakes if he asks it.

If you positively cannot say on paper what you want to say and say it so people will understand you easily, then you will do well to ask assistance and perhaps even to engage someone to write your advertisements for you, but in any event, advertise!

Be Original.

No one knows as well as you what you have to offer the public in the way of goods or service. No one knows as well what your patrons want. Therefore you should not take to using ready made advertisements supplied from the outside. You may be able to buy advertisements with more rhetorical flourishes than you could give them, but the value of your advertisement lies in its ability to get business. Get up your own copy, even if it is not very good at first. Stick to it, writing and rewriting each advertisement, gaining in experience all the time, studying the advertising of men whom you know are good advertisers and adopting their ideas. You will be a better advertiser each year and your advertising will have the individuality that belongs to it, because it is your own.

One question that many garage proprietors feel unable to answer satisfactorily is how much money to spend in advertising. An off-hand answer made to fit all cases would fit none. Each individual case requires a different answer. Still there are certain things to be said that are applicable to all cases.

How Much to Spend.

The merchant, advertising a store, considers that two per cent of his gross sales is not excessive as an advertising appropriation. That is not a rule that can be applied to garages in just that way. A garage should, I think, plan to use such an amount of advertising as will be effective in producing a gain in business.

If your receipts last year were $20,000 and you feel that you could take care of a $25,000 business this year and that the extra $5,000 is there for you to get, I would suggest that you consider the advisability of spending on advertising a sum equal to the larger portion of the net profit on that increase. The intelligent use of a few hundred dollars in advertising should bring in some thousands of dollars worth of business.

The man who is just starting a garage must use advertising without reference to his receipts, because at the outset, he has no receipts to serve as a basis. He must spend what is necessary to get the business or he must quit. The man with a going business must use as much advertising as will at least maintain a slight growth, because the business that stands still will fail. Put aside for advertising enough money to do creditable advertising. If you use the newspapers, and nothing is better, take space enough to make it look as if your business amounted to something. A shoe repair



The First Week's Advertising Brings But Few Customers; The Long Line of "Regulars" Can Only Be Obtained by Constant Advertising.

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shop might well enough use a small newspaper space and it would not look out of place, but a garage and automobile business is thought of in a large way and to use a small space in a newspaper, unless it is a metropolitan daily, would have a tendency to make people think your business insignificant.

Advertising Pays.

Within any reasonable limits any sum you spend in good advertising, in judicious advertising, well placed, will repay you for the investment, so you need not worry about its being a loss. Consider each bit of advertising you plan and consider it well to determine whether or not it is worth the cost. If it is a standard kind of advertising, not a freak stunt, you are pretty safe in going ahead with it. If it is something out of the usual run, something in the nature of an experiment, it is probably better to play it safe and leave it alone.

If you do not trust your own judgment in the matter of advertising, go to some successful advertising merchant in your town and ask his advice. Spend more time in planning how to get up good advertising and less in seeking to get out of spending money on advertising. Advertising should be the life of your business and the source of its growth.

COAL HAULAGE BY TRUCKS.

Recent Coal Famine Demonstrates the Need For Coal Trucks Throughout the Country.

BY FELIX J. KOCH.

Never in all the history of our big republic have people in the great Mid-West gone through such a winter as that just passed; and, now that Heatless Days and Fuelless Days, and seasons of fastly-diminishing gas-pressure and so on, luckily are over, the victims of a winter without a parallel; but doubly dire, because of war-times; are recounting the lessons brought forth by the calamity, to themselves.

Not the least interesting, as well as valuable, to both auto dealer, who is seeking to convince wavering clients; and to coal-men, who would learn lessons by what has gone before; is the worth of good, reliable, motor-trucks, able to "buck" the snows in times of such exceptional conditions.

In Cincinnati, though situated on the Ohio, and a reputed artery for the coal-fleets from the mines, coal might be found occasionally in the yards. Quite a bit of coal was actually reported at Silver Grove, Ky.; just a few miles outside the 'cross-the-river town, but teams couldn't haul over the glazed streets and through the growing snow drifts; nor could private autos, impanelled to such unwonted purpose, get about.

One Concern Prepared.

One great concern, fortunate in having the coal, did make its deliveries almost without fail, and this was because, in proper season, it had equipped itself with suitable motor-trucks.

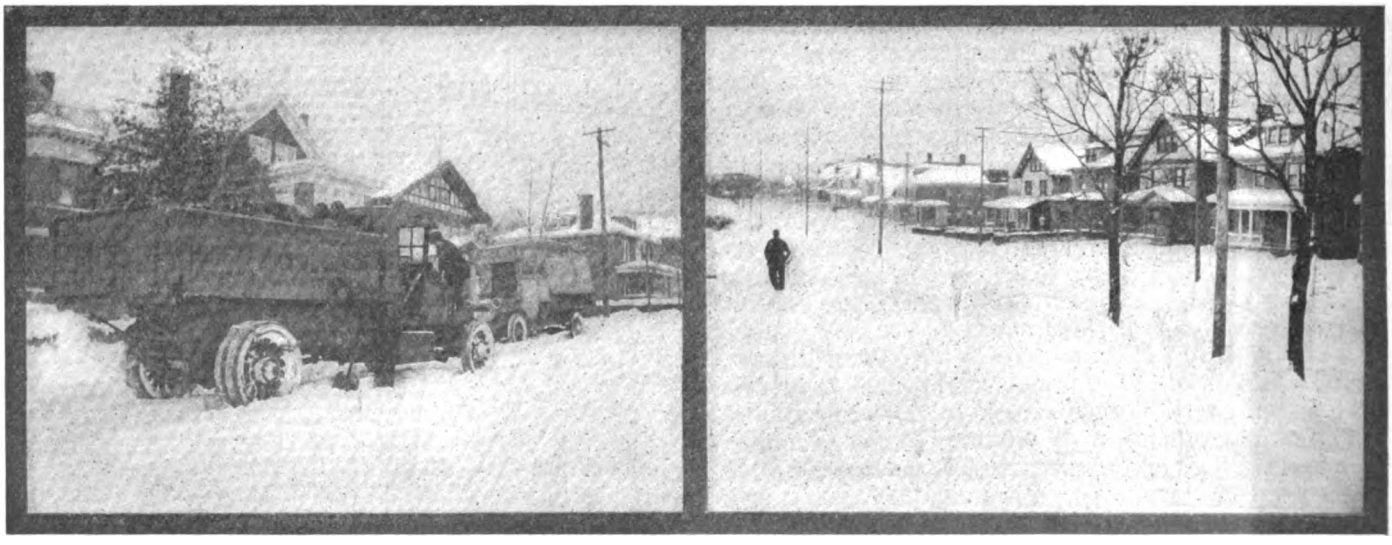
"Our company," its managers told us, "have at their command two trucks of one type, and two other types of machines, which, for a concern of our size proves adequate.

"During the exceptional cold and snow I'll admit that very occasionally the heavy coal-trucks did have a pretty hard time of it, getting through the snow-banks on the steep hills here, as best they could. When stuck, however, the men would throw bits of coal under the wheels, and with this and, of course, the use of chains, they did manage to keep going. What was more, their every trip represented a movement of from five to five tons and a half of coal.

"Had we had horse-drawn coal wagons, as of old, it is doubtful if the horses could have made the slippery hills, or kept from stumbling in the snows. They would have had to rest, again and again, and with that, each full load would have meant but a ton and a half of coal."

One of the pictures serves to give an idea of the conditions of the streets, through which the coal-trucks were forced to traverse; and one of the photos shows what, at moment, proved a sight for folk to rush to see—an auto-truck, coal-laden, actually in progress there.

This is but one instance out of many, for all over the country the motor truck was utilized for carting coal and food for the suffering people. Doubtless the merchants and store men in the various small towns of the country have profited by this winter's experiences and realize the great value of motor trucks in their business, which, in many cases, would not have continued had it not been for this useful machine.



During the Recent Coal Shortage Motor Trucks Were the Only Possible Means of Transportation in This Town Where the Snow, in Places, Reached to the Piazza Floors.

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Repainting the Car for the Summer Season

How to Clean Off the Old Paint and Varnish and Put On a New "Dress" Which Will Last Throughout the Year

BY JAMES F. HOBART, M. E.

About this season every year a great many automobile owners get into trouble through the idea that they can save a bunch of money by painting and varnishing their own car. If, however, a man desires to learn something about these matters, he sure can do so, if he profits by his mistakes, finds out why he was wrong, and then looks out for it next time. That's experience, and the experienced

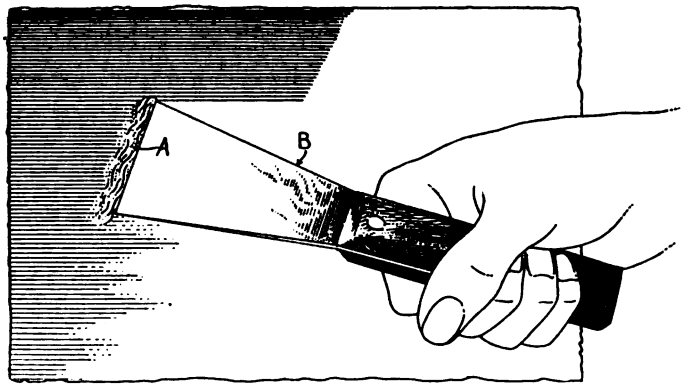


Fig. 1.—A Putty Knife May Be Used to Remove Softened Paint.

man can paint a car as well as a painter, provided his experience is equal to that possessed by the "Knight of the Brush."

Prepare the Surface.

The right way to paint a car is to get the surface good and ready before you start painting. You can't do a good job unless the surface is made just right, before the paint and varnish are applied. You can't do a good job of painting over an old coat, and you can't do a first-class job of varnishing over a cracked or lumpy surface of old paint. The old coats MUST COME OFF, if you want a first-class job—there is no "if or and" about it—the old coats of varnish and paint MUST be removed and the surfaces made smooth and clean before applying the new coats of pigment.

The removing of old paint and varnish from the surface of an automobile, is no joke, as anybody knows, who has tried it once or twice. If the car only needs revarnishing, it is a comparatively easy matter to take off the old coat of varnish, for the application of strong water of ammonia, allowing it to remain on the paint for one-half to three-quarters of an hour, will so decompose and loosen the varnish, that it may be scraped off in the form of jelly as at A, with a putty-knife, B, or a scraper, as shown in Fig. 1. If it don't all come off clean at first, paint on more ammonia, and scrape it again in a short time.

Removing the Paint.

In the removing of the paint is where the "rub" comes, and where the "scrape" comes too. From the wooden parts, and from the thin metal portions of the car the paint may be removed sometimes by means of a gasoline blow torch, Fig. 2 at A; the paint being softened by the hot blast as at B, and removed quite easily with the same scraper used for taking off the varnish.

The removal of the old paint from the solid metal portions of the machine is where trouble comes aboard. Sometimes it is utterly impossible to remove the paint without chipping it off, and that's a mighty good way of doing it. A sharp chisel, A, Fig. 3, and a light mallet, B, and off the old paint comes, bit by bit, as at C, until the whole surface has been gone over—and when it's done, you will wonder how the manufacturer put so much surface area into one little old automobile! When there is a good supply of compressed air, as there should be in every garage, obtain a little pneumatic hammer, and you can remove the old paint in a hurry. There's nothing like a pneumatic hammer for removing old paint, and every automobile painter should equip his shop with such an outfit.

I don't intend to take space for telling how to paint an automobile, or what paint to use, save to say that the thinner the coats, the more of them, and the better the sanding and rubbing down between coats, the better will be the resulting job. Be sure to allow plenty of time between coats of paint. You can't get first-class results with a heavy coat of paint or enamel placed on top of another green or

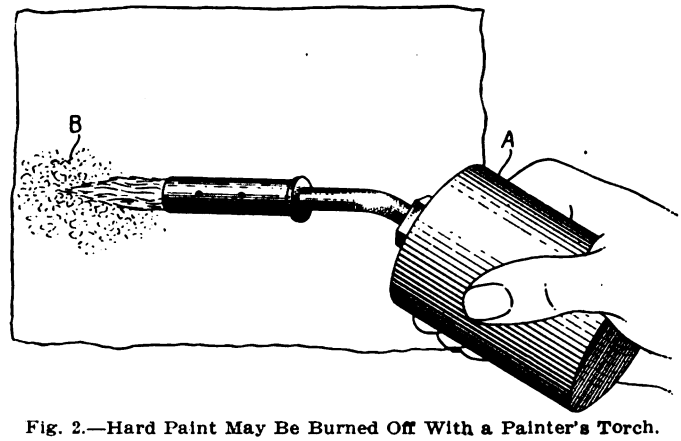


Fig. 2.—Hard Paint May Be Burned Off With a Painter's Torch.

undried coat. It is useless to expect satisfactory results from that way of painting, therefore, don't try it.

It's the varnishing which we will consider mostly this time, and I intend to tell of some of the troubles I have been up against, and which I have seen others encounter when doing their own painting and varnishing. Painting is an important part of work, just as the cleaning off of the old coats of paint is something upon which the quality of the varnishing depends largely.

Cause of Milky Appearance.

When the experienced varnisher calls your work a "Blooming" bad job, he means that the "blooming" is a misty appearance of the surface which was probably caused by the dampness of the room in

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which the varnishing was done, or in which the car was kept. Sometimes this trouble appears a long time after the varnishing is finished. Sometimes the appearance may be remedied by drying out the work thoroughly and then going over the surface with a good polish made of linseed oil and varnish, mixed together, rubbing the surface the same as in French polishing. This MAY remedy the trouble, but sometimes it won't satisfactorily.

When the finishing coat loses its gloss and becomes "dead" it may be caused by improper filling, if upon a wooden surface; or because the under coats were not fully dried before the outer ones were applied. The only remedy for "Flattening" is to rub down the surface and give the work another finishing coat of varnish.

Another very frequent and very bad defect in amateur work is "cracking." This is usually caused by too heavy undercoats, or by putting on a follow coat before the previous coat is ready for it. Cracking must not be confused with "checking." The former is a lot of coarse cracks, the latter a network of very fine ones, which are caused usually by sudden cold blasts of air upon the varnished surface. A blast of cold air in the varnishing room may do it. Or, you may check an otherwise fine job of varnishing by the use of too hot water while washing the surface of the varnish. There is another cause of checking, which sometimes occurs, and that is, revarnishing the car with a hard, brittle varnish—"short-oil" varnish, as it is called, applied over a coat of elastic varnish. This causes the outer coat to become "hide-bound" and crack open in many fine lines, as the under elastic coat of varnish expands. Checking, as well as cracking, can be cured only by removing the defective coats, right down to the seat of the trouble, and then varnishing anew.

Cause of Furrowing.

Sometimes the varnished surface presents a peculiar appearance, as though the varnish had run

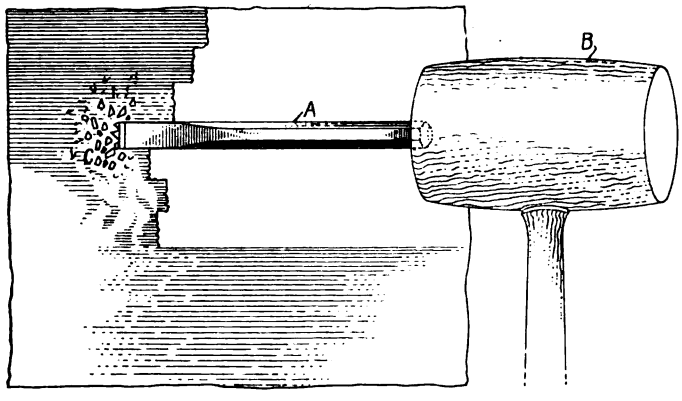


Fig. 3.—Exceptionally Hard or Brittle Finish May Be Chipped Off with a Cold Chisel.

down in little furrows, frequently presenting the appearance of field freshly plowed with very light even furrows. For this reason this defect in varnish is called "furrowing" and is often caused by too much change in the temperature of the varnish room while the work is drying. Or, it may be caused by a heavy draft striking the work during the drying period. Sometimes this defect—also called "crawling"—is caused by placing a varnish coat upon a cold surface, or over one which has not dried sufficiently. If the defects appear in little patches instead of in furrows or lines, it is known as "pitting," and the little pock-marks are caused by the same things that cause crawling or furrowing. The remedy is, of course, the same, and that is, keep the work warm and at an even temperature while varnishing and while drying. Here the "dry-house" method of varnishing comes in remarkably well.

"Specking" is one of the most frequent troubles met with in cold weather. It may be due to several causes—by a dirty foundation for the varnish, because the paint coats are not clean and free from dust, or because the brush or the varnish container is not clean. Then there is "can specking," so-called, due to the varnish having been kept in too cool a place. The oil in the varnish having partially congealed or frozen, appears as little lumps or specks in the varnish. The remedy is a very simple one indeed—just keep the varnish can where it will be warm and not subject to changes of temperature as it would be in a room kept warm during the day and allowed to become cold at night. Keep the work, the brush, and the varnish can clean, the room at an even temperature, day and night, and you will have no trouble from "specking." Dust in the varnish room is one great cause of specking and may be added to the causes noted above.

Sometimes the varnished surface presents a queer appearance, as though it might have been applied to an uneven surface like that of bread dough. Ask an experienced varnisher what the trouble is, and he will tell you that it is "sagging," or "wrinkling," and if you can get him to tell you the cause of the trouble, you will find that it is due to applying the varnish in too heavy or in uneven coats—mighty little reason, the novice may think, but it is enough to cause a whole lot of trouble, and one which can seldom be cured, except by removing the varnish coats and starting all over again upon a clean paint surface.

There are some other troubles which the beginner in varnishing will probably encounter, and doubtless one of these will be the peeling off of portions of the varnished surface, possibly soon after the job has been completed, though it may also take place a long time after the work has been done.

Cure for Flaking.

When a section of the varnish peels off slick and clean and comes at the bare touch of the fingers, the trouble is called "flaking," a very bad trouble it is too, and one which is hard to remedy, for it often calls for the removal of the entire varnish work and the revarnishing through all the coats, from the paint up to the finishing coat.

It is very hard indeed, sometimes impossible, to remove and repair a flaked spot and have the new work match the old. Indeed, when this is done, it is almost always necessary to remove the varnish from the entire surface—be it side, end or top, of the affected piece. The other sides can be left as they were, and the joining of the new and old work made on the edges or corners, where the seam will not show, as it might if the joining were done in the middle of a large flat surface.

Sometimes "sweating" may be cured by rubbing with a rag dipped in a mixture of shellac and linseed oil. This action is really "French-polishing" the sweated portion, but this will not always remove the disfiguration, and it is necessary to re-rub the sweated surface, then refinish with a hard drying

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varnish which will not sweat. But there are cases where this method will not answer. It may be possible that a varnish was used which never will dry hard. There are such; all "elastic" varnishes belong to that class, and in such cases it will be necessary to refinish the surface with a varnish which will dry hard. In cases of this kind the old and soft varnish should be rubbed to a dull surface before the new finishing coat is applied.

Kind of Paint to Use.

In regard to the kind of paint and varnish which should best be used upon automobiles, I shall leave that matter entirely to the fancy of the automobile owner, the conscience of the paint and varnish dealer, and to the section of country in which the painting business may be located. It makes just a bit of difference whether the varnishing is to be done and used in Alberta, or in Mexico, as some autoists have found, when they finish a car in a cold country and tour in a hot one. To be sure, this stunt in the paint and varnish line can be successfully carried out, but it must be looked after before the painting and varnishing is done—not afterward!

A good many automobiles are enamelled, instead of being "hand-painted" and varnished. And if the enamel is good to begin with, and properly applied, it seems to the writer to be far preferable to the old-time paint and varnish. The enamel wears well, and, being solid and uniform from top to bottom, it wears long, and when damaged by abrasion or rubbing it sems to show the defects much less than does paint and varnish.

Don't Mix Your Own Paint.

Should you decide to use paint and varnish, do not try to mix the paint yourself. There are so many good ready-mixed paints on the market now that it doesn't pay to try and mix them by hand. Furthermore, you can't—nobody can—mix paints by hand as well as they can be mixed by machine. The most thorough stirring with paddle and stick can never mix the pigment and oils as well as passing them through a paint-mill, where they are ground intimately together. Not a particle of the pigment escapes the grinding and mixing machine. Therefore, use ready-mixed paints put out by some reputable maker, and you will obtain better and more lasting results than is possible with paints mixed by hand.

Hand-Mixing Paint.

Once in a while, in some parts of the country, it may be necessary to mix a lot of paint by hand, all the ready-mixed paints on sale to the contrary. Sometimes the dealer "Keeps it, but is out just now," and one has to use what he can get. Therefore, if it comes right down to a "white lead and oil" proposition, it will pay to go about the paint preparation in a certain way—not to throw the ingredients together haphazardly.

First, see that the white lead is soft and free from lumps. If the cover is left off the keg, the surface oxidizes and there may be dirt in the lead oxide. Be sure to get all of this out before mixing the paint. Some men mix it, dirt and all, and then strain the paint afterwards. But it is a better plan to clean the lead before mixing in the colors and the dryer. To do this, separate all the lumps from the clean oxide, and with a little oil, or if that fails a bit of turpentine, rub up the lumps. The oil will dissolve the good paint, leave the dirt, and enable one to separate the good from the bad.

A piece of thin, strong cloth will do nicely. Spread the cloth over a can, pour in the paint, fold the cloth and squeeze the good paint through, leaving the dirt and hard lumps behind. The liquid portion may be returned to the cloth as many times as necessary, until the oxide has been well cleaned. I have used dried white lead which had to be broken into lumps with a mallet before it could be put into the squeeze-

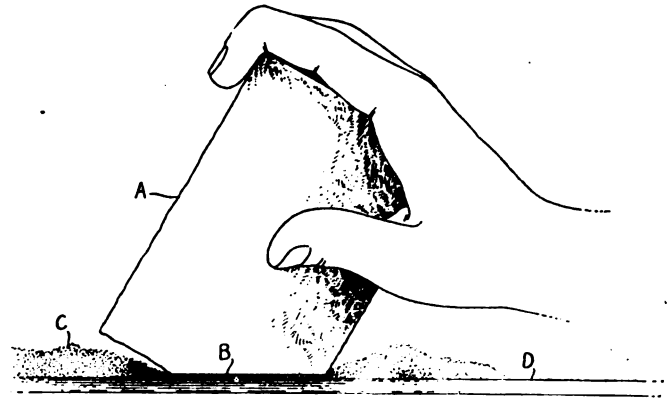


Fig. 4.—Dry Paint May Be Ground Upon a Glass or Marble Surface With a Flattened Brick.

cloth, but one should not use such stuff if one can get better, for it takes too much time and patience.

Paint Mixtures.

I like to mix about one-third zinc oxide with the lead oxide, for it seems to stand the weather longer and gives a better surface than lead alone. If the zinc oxide is ground in oil, handle it exactly the same as you did the white lead, but if the zinc is dry (in powder form), then there is more hard work to be done, which entails the mixing of the zinc oxide with some oil. To do this I prefer to moisten the dry zinc first with a little turpentine, then work in some boiled linseed oil. To do this I use a flat palette knife, placing the zinc and oil on a big pane of glass, and grinding the zinc thereupon with the flat of the knife.

Sometimes it will be found necessary to grind the oxide more than can be done with the knife. When this is necessary, obtain a smooth cobble stone, A, Fig. 4, about as big as a large cocoanut, and chip off one end, B, leaving a flat place about 3x4 inches if possible. Smooth up the flat place on an emery wheel, and make it fit the glass as much as possible. Then you can grind the paint C between the glass D and the stone A, as well as it can be done in a paint-mill, but very much more slowly, of course.

After the turps, the dryer and the colors have been added to the oil, lead and zinc, grind them well with the stone "muller" upon the glass, and you will have some good paint.

Tractor Demonstration.

An educational tractor demonstration will be held under the supervision of the Society of American Agricultural Engineers by the California Tractor & Implement Association at Davis, Calif., on April 17th, 18th, and 19th. This demonstration is to be more in the nature of a test and a great number of tractors will be entered. Each tractor is to be given a practical try-out in plowing, harrowing and other work.

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Suggested Ford Car Body Design for Carrying Hunting or Fishing Outfit

A Compact Camping Outfit For the Car Owner Who Prefers to Enjoy His Vacation Close to Nature in the Open Air

That "grand and glorious feeling" which is often termed "Spring Fever," just about this time begins to attack every person who likes an outdoors life. Doubtless every nature lover, at some time during the past hard winter, has looked with longing at his picture collection and talked over with his friends the big fight which he had last summer with a particularly big trout.

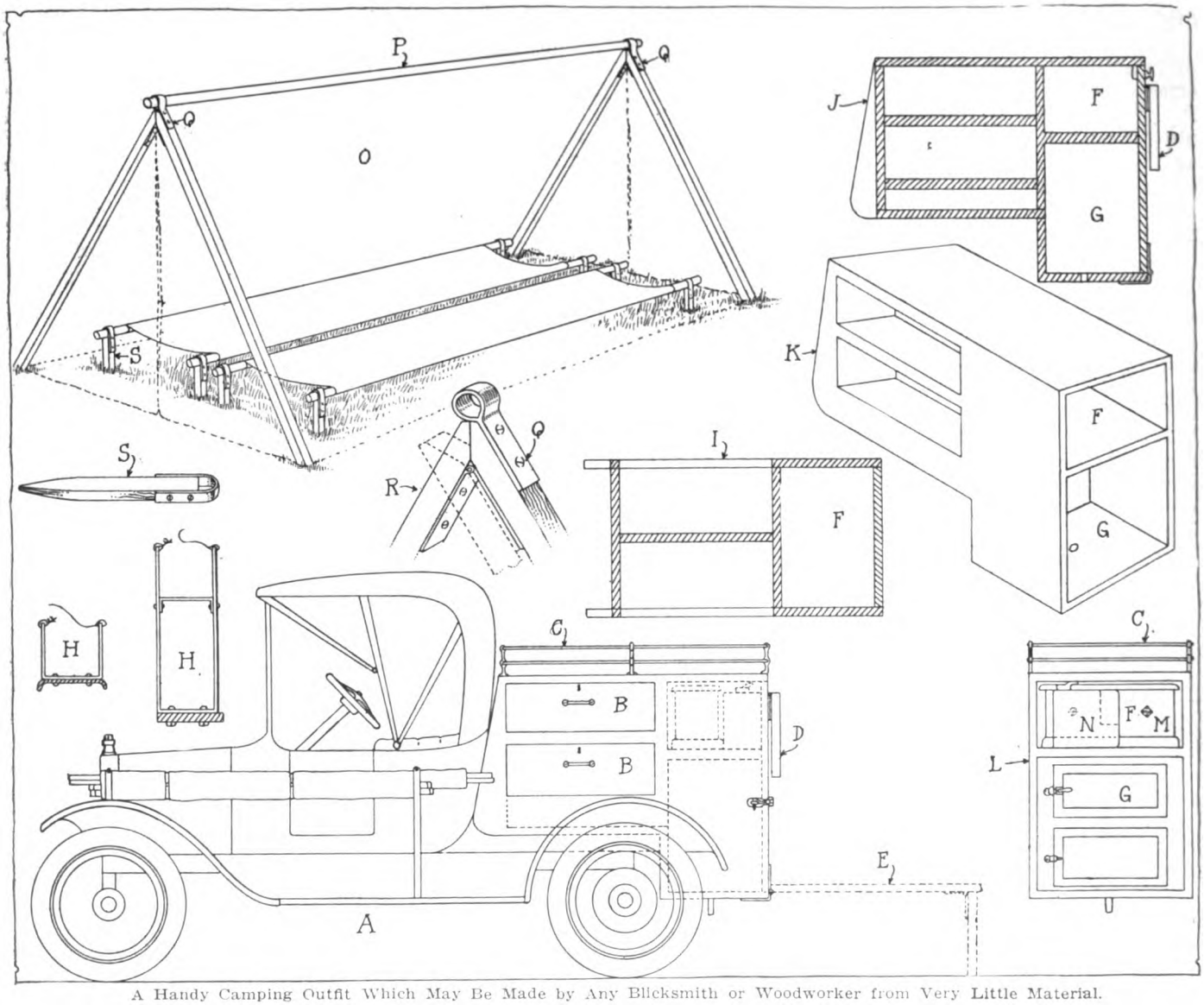
If he has been fortunate and a good hunter, he may have the head and antlers of a proud stag in his den at home, to bring back the thrill of the chase.

Perhaps he is neither a hunter or a fisherman, but simply likes to be out of doors where he can breathe the fresh air, untainted by the dust and smoke of city or town streets.

In any event, if he owns an automobile, now is the time that he longs to ride, and ride, and ride, forgetting his office for the time being and climb the hills into the country.

The average autoist does not care to be hampered in his longer trips, or when he is fishing and hunting, by the feeling that he must depend upon a hotel for meals and shelter. He usually prefers to carry along, in his car, a tent and a few blankets so that he can camp wherever his fancy dictates, and so we have designed this camping body, particularly for the Ford car, but applicable to practically any type of roadster.

This body may be constructed by practically any man handy with tools, and from "odds and ends" of lumber which may be picked up at any carpenter shop. It has been designed in such a manner that little or no joining work is necessary. The largest



A Handy Camping Outfit Which May Be Made by Any Blicksmith or Woodworker from Very Little Material.

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pieces of stock are required for the sides, which are made of one piece, to obviate the need of fine joining; while the balance of the body may be made from short lengths of pine or other cheap stock.

When complete, as shown at A, the whole design harmonizes with the general lines of the car body, and presents a neat and attractive appearance, much preferable to a pile of bedding, tents, tinware, etc., such as might be required in a camping outfit.

At the front end, the body measures two feet, seven inches in height with a "hang-over" back which drops below the chassis frame, and measures, over all, three feet, seven inches. The total width is two feet, seven inches, and the length four feet, four inches. The body may be bolted to the flooring of the car, or to the chassis frame as desired.

Four large drawers, two in each side, as shown at B, B, are the main compartments and serve to carry the smaller bedding materials, bathing suits, articles of clothing, etc. One of the drawers should be reserved for cooking utensils and divided by partitions for smaller articles such as knives, forks and spoons. When the lower drawers are removed, there is a space beneath, in which may be packed large flat pans or similar articles.

The rear of the body is divided into two large compartments, F and G, by a horizontal shelf; the upper arranged to contain a small, two-burner oil stove and a can of oil; the lower containing a small ice chest. A hole should be cut through the bottom of the lower compartment to permit the escape of water from the melted ice.

Hinged at the lower part of the rear is a large door, E, which is fitted with two folding legs, D. When this door is let down and the legs extended, as shown in the dotted lines, a convenient table is had.

Surrounding the top of the body is an ornamental railing C, which serves to keep articles placed on the top from rolling off, and to which may be fastened tents, bedding, etc., covered with a rubber blanket which is tied to the railing.

To serve as tent pole carriers, a bracket is mounted on the front fender and a post-bracket on the running board. Straps at the tops of the brackets, shown in detail at H, H, serve to hold the contents in place. The brackets are made from strap iron, 1¼ inches wide by ½ inch thick, and are heavy enough to carry the tent poles, two ordinary pole-cot beds, rolled up, and a long-handled net, or fishpole.

The body may be made of 1½-inch panel boards throughout. View I shows a sectional plan, while a side view appears as at J. View K shows the body with the drawers and door removed. View L shows the rear with the door removed, exposing the ice chest in compartment G, the stove at M, and the oil can at N. The tent and bed arrangement is shown at O.

The top tent pole, P, is two inches square and eight feet long and is held in position by the two loop brackets, Q, Q, which in turn are fastened to the tent legs as shown. The four tent legs are six feet, three inches, by 1½ by one inches and hinged at the center so they can be folded together when not in use, as shown in sketch R, indicated by the dotted lines.

In setting up the tent, the pole, P, is held securely in the brackets, Q, by a small wedge shaped piece of wood, then the canvas is stretched over the entire frame and pegged in the ordinary manner, making a strong, simple, but complete tent.

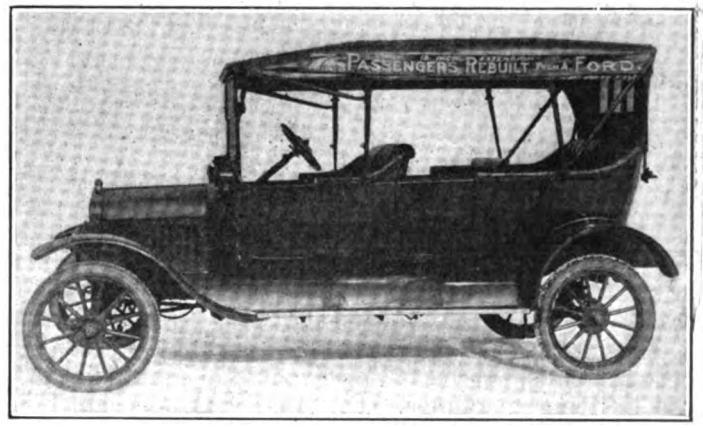
An ingenious method has been devised for holding the beds. The pegs, S, are two feet long and 1½ inches square and pointed at one end. At the top is a short piece of strap iron bent to form a loop for the end of the bed pole. When the stakes are driven into ordinary ground they are sufficient to hold the heaviest person and prevent the annoying swinging together of the bed poles, so common with the "stretcher" type of bed.

In designing this outfit the greatest care has been observed in making the whole construction simple. At the same time, however, there has been no sacrifice of utility, and the outfit should be of great value. It should be ideal for the owner who might not care to put out much money on camping equipment.

A Seven Passenger Ford.

A concern called the McIntyre Motor Trucks Company, having a factory at 100 West 55th Street, Chicago, Ill., has been organized to build a conversion unit whereby the standard Ford touring body may be lengthened sufficiently so as to allow the insertion of two more seats in the tonneau. Such is the construction that from outside appearances, one can hardly determine the point at which the standard body has been altered.

In lengthening out the machine the rear axle con-



How the Ford Looks After It Has Been Extended 18 Inches.

struction including the regular propeller shaft and universal joint is moved backward 18 inches. The frame is lengthened by the addition of two side members which are hot rivetted to the stock members and telescoped in them, in such a way as to give maximum strength and rigidity. Between the old universal joint and the gear-set is interposed a short length of shaft fitted with suitable male and female connections and surrounded by a casing which is flanged on both ends to fit the gear set and the present ball and socket section. The short length housing is rigidly fastened at its rear end to a cross member.

The most radical change is made in the body itself, which is cut down directly in back of the rear door through the sills in such a manner that the back seat is drawn backward approximately eighteen inches. The old rear doors are left in their regular places and between them and the back is fitted an extension piece which does not alter the contour of the body to any appreciable extent. This extension piece is covered at the top with imitation leather to match the seats. The top also is length-

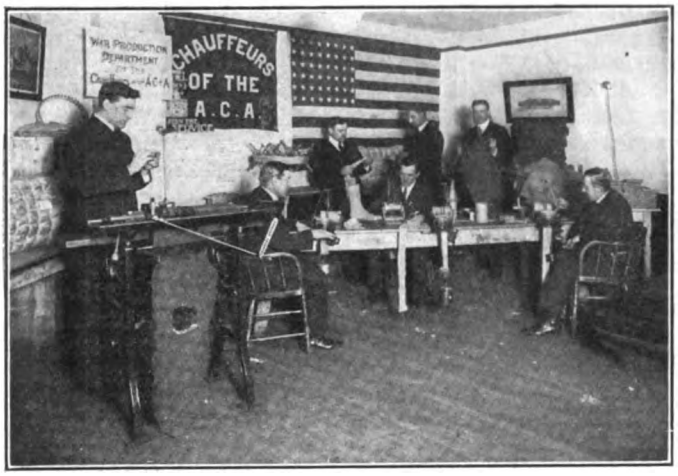
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ened slightly, a new top being supplied with the equipment which fits the present bows. Where a one-man top is used, as shown in the illustration, an extra price is made, for in this case a full new top is necessary.

The manufacturers claim that with the increase in the body length an easier riding car is had and that the present objection due to the stiffness of the Ford body is entirely removed.

Chauffeurs Do Knitting.

The chauffeurs of the Automobile Club of America have established a Red Cross workroom in their clubroom in New York City, where they operate sweater and sock-knitting machines. They have formed themselves into an auxiliary of the New York County Chapter of the Red Cross. Wool for their work has been donated by the Colony Club and since their first sock machine was given to them on December 4, they have turned out over 1,000 pairs.



War Production Department of the Chauffeurs of the A. C. A.

The men, who have to work at odd moments, between calls, are becoming experts in manipulating the knitting machines. One man has so perfected his work that he can finish a sock every four minutes. Still another can turn out a sweater in fourteen minutes. Men work in relays. When one leaves off another takes up the job.

Twenty-five chauffeurs in the last three months have become expert in the operation of machines. They received their first sweater machine December 18 and since then 200 sweaters have been completed.

Automobile Drivers Needed.

Mr. W. O. Wilson, Secretary of Motor Transportation for the National War Work Council of the Y. M. C. A., 124 East 28th Street, New York City, has just returned from France to recruit in the United States what our French allies call "Gentlemen Drivers." In other words, Mr. Wilson appeals particularly to the well-to-do business man who owns and drives his own automobile. There is work for him to do overseas, and it is hoped that seventy-five men of this calibre will be ready to sail very shortly. It has been planned for about fifty men to sail in April and as many more in June if possible.

These drivers will not be required to do repair work, although the exigencies of a situation in the battle areas may make them more valuable if they can do a bit of necessary repairing now and then while on the road. Any man of fifty years who is in good physical condition can qualify for this service. He will carry supplies which are not otherwise handled by the Quartermaster's Department from the Division Headquarters of the various Y. M. C. A. huts in the lines.

Marking Requirements.

The various express companies operating in the United States and Canada, through the Express Traffic Association, 61 Broadway, New York City, have issued their supplement No. 5 to official express classification No. 25 which deals with the marking requirements, on various commodities passing through their service. An extract covering the requirements relative to automobiles is given herewith.

†**Marking Requirements:**

(a.) Each package, bundle or loose piece in a shipment must be plainly, legibly and durably marked, showing the name of only one consignee, and of only one station, town or city and state to which destined.

(b.) Shipments wrapped in paper, or packed in boxes, crates, barrels, corrugated paper or fiberboard containers must be marked with pen, brush, stencil, waterproof crayon, or by label securely attached with glue or equally good adhesive. Such shipments must not be accepted when marked only with tag except as provided below:

Shipments of iced goods, such as fish, oysters, etc., must be marked with brush, stencil or waterproof crayon, or with two tags securely tacked, one of which must be sunk in a groove in the box or case, or otherwise protected in such manner as to prevent becoming detached or defaced by contact with other articles or surfaces.

Containers which are customarily used several times for transportation of goods by express, such as bread boxes or dog kennels, which cannot be satisfactorily marked with brush, stencil, waterproof crayon or label, may be accepted when bearing two address tags securely attached to the package.

(c.) **Castings, Machine Parts, Shafting, Pipe, Rods, Bars and Other Metal Articles:**

1. When boxed, barreled, crated or trussed, must be marked in compliance with paragraph "(b.)"

2. When not boxed, barreled, crated or trussed, and there is sufficent smooth surface for the purpose, the address must be plainly marked on the article with durable paint. Such shipments must not be accepted unless marks are thoroughly dry.

3. When not boxed, barreled, crated or trussed, or when not possible to mark as provided in preceding paragraph, shipments must be marked with not less than two wooden, leather, metal, cloth, rope stock or sulphite fiber-tag-board tags. Rope stock or sulphite fiber-tag-board tags must test not less than 14 point, 50 per cent. rope, have reinforced metal eyelets and must be attached by wire not less than 23 gauge, or strong tarred cord. Tags must be attached wherever possible to unexposed parts of the article in order that they may not become detached in handling.

4. Rods, Shafting, Bars, Pipe, Iron Bed Sides, Automobile Springs and other articles of like character marked with tags as provided in paragraph "3" must have the tags securely wired to the article, and in addition, a concealed tag bearing the same address, must be bound to the article with burlap covering, the latter securely wired at each end.

(e.) **Automobile Tires.**—When not boxed or crated must have two marks, both to be attached to the inner surface of the package, bale or tire, and to consist (1) of a strong tag securely attached, and (2) another tag bearing the same address, securely bound by burlap or cloth, or an address label pasted on the inner surface.

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Two Handy Devices for the Garage

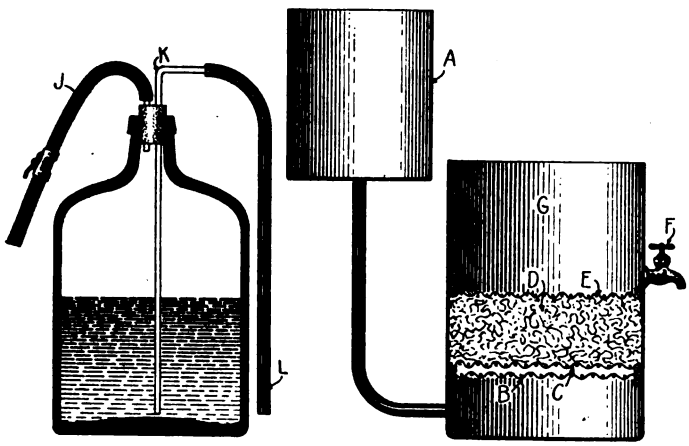
A Distilled Water Container and An Oil Filtering Arrangement which Should Be of Interest to the Repair Man

The writer quite recently had the good fortune to go through a large service station where everything was arranged so as to obtain a higher efficiency, and there were two devices which appeared to him to be about as practical as anything in the garage.

The first of these was used for the distilled water supply for storage batteries, and the method used for keeping this supply clean was in great contrast to that of some garages where the battery water is kept in dirty bottles or tin cans, without due regard for cleanliness.

The garage owner had obtained a large rubber cork from a mechanical supply house and through the cork had punched two holes, into which he had inserted two lengths of glass tubing. One of the tubes was just long enough to pass through the cork and was fitted with a length of rubber tubing about three inches long. Clamped over this piece of tubing was a shut-off device which squeezed the tubing tight and prevented the entrance of air. The other piece of glass extended to the bottom of the water jar, and at the upper end was bent over at right angles. This was also fitted with a length of tubing which, however, was long enough to drop down the side of the bottle nearly to the bottom.

In our illustration, H shows the water bottle, J the first length of tubing, K the outlet, and L the long rubber tube. When the filtered water was



A Handy Distilled Water Container at Left, and a Practical Oil Filter at Right.

received from the supply house the rubber cork and all the fittings were removed from the old empty bottle and placed in the new. A slight amount of air pressure upon the tube J with the clamp open started the water through the outlet tube L, which thereafter became a siphon.

When a battery was to be filled, or distilled water sold to an autoist, the clamp on the vent J was loosened and the receptacle placed beneath L. In this way the filtered water would always be kept clean, and there was no necessity for transferring it from the large container to smaller containers for use with hydrometer filler. The idea was particularly good for the very reason that there was absolutely no chance for dust or foreign matter to get into the filtered water, and the water was kept as clean as when distilled.

Oil Filter.

The second device, which was interesting, was designed for the filtration of lubricating oil and was an indication of the efficiency of the management of the garage. As every reader knows, practically all of the automobile manufacturers advise the changing of lubricant in the engine every four or five hundred miles. This advice is good, because present-day fuels have a tendency to get into the lubricating oil and work into the engine base, thereby destroying the efficiency of an oil.

The garage owner did not like to see all of this oil wasted and so installed the apparatus which is illustrated. The device consisted of two large cans connected by a length of one-quarter-inch brass piping. The piping was fastened to the bottom of the can A and to the lower side of the can G. At B in the lower can a circle of fine brass mesh screening was held in place by a circular ridge which was soldered into the can. About half an inch above this was a second finer screen, shown at C. A medium mesh screening was placed at E and the space between E and C was filled with a mixture of cotton waste and steel wool. As the oil was filtered by gravity pressure, it escaped into the upper reservoir at G and could be drawn off from time to time through the spigot F. The writer thought that the principle of the filter was well worked out, for all of the heavier particles of carbon or dirt would settle in the lower part of the can, beneath the screens, and would not clog up the screens, as it might if the oil were to filter down through as an ordinary oil filter.

The idea of using a mixture of steel wool and cotton waste was particularly good because the cotton waste if used alone would have matted down very quickly and prevented the passage of the oil, whereas in this case the steel wool kept the cotton waste well open. All of the screening and the waste compartment were so arranged as to be removable. Practically the only screening that did not rest upon the soldered ring containers was the top one. This was fitted so as to slip beneath the upper ring and was held into place by projecting lugs. Of course the garage man did not use the filtered oil for automobile engines, since the lubricating properties had been, to a certain extent, destroyed. This oil he found of great value around his machine shop for lathe-turning and screw-cutting machines and for lubricating slow-moving machinery parts.

Either of these devices might be made by the average mechanic and are applicable to small garage usage as well as to larger shops. An oil filtering device along these lines, but considerably smaller, might be made by a small garage owner and the filtered oil used for lubricating such parts of the automobile chassis as do not require a high grade of lubricant.

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The A B C of the Storage Battery

1—Telling What a Storage Battery Is, Its Internal and External Construction and Its Action During Charge and Discharge

BY A. P. PALMER, E. E.

A battery consists of a number of cells arranged together with their terminals connected so as to give a combined electrical discharge greater than could be obtained with one cell. A cell is the unit in a battery and consists of one or more positive and negative plates or electrodes suspended in a solution or electrolyte so that when their terminals are

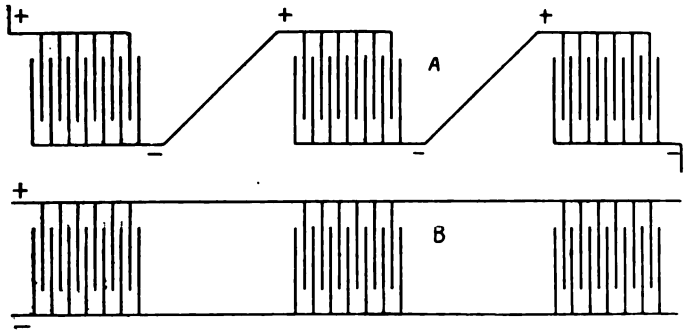


Fig. 1.—Cells Arranged in Series at A, and in Parallel at B.

connected an electrical circuit is made. The electrode out of which current flows into the external circuit is called the positive. The other electrode is the negative.

When the terminals are connected together the solution acts upon the plates, depositing a compound formed and producing an electric current, the electrolyte losing in weight.

When the cell is discharged a current may be sent through it from an external source in the opposite direction reversing the chemical re-action and recharging the cell.

The solution used, called the electrolyte, is a mixture of sulphuric acid and distilled water and the plates are of lead. When the cells have like terminals connected together they are said to be in parallel as at B, Fig. 1, and when the positive terminal of one cell is connected to the negative of the next cell they are in series, as at A, Fig. 1. Series connection gives the combined voltage of each cell, with unit current, while parallel connection gives unit voltage with the combined current capacity of all the cells. If three cells were connected in series the voltage would be three times that of a single cell or six volts, assuming the voltage of a newly charged cell as two volts.

Heavy Usage Required.

A starting battery does work which has never been previously acquired of any battery. A small six-volt battery is often called upon to deliver as high as two horse power, for a short time, and may even start a large touring car on the high gear. Therefore, a starting battery must be made of special materials or its life will be of short duration, yet it must be light and inexpensive. If the plates were made of platinum the battery would last for a long time and would be light, but the cost would be too great.

Power is not the only factor. A storage battery must be ready at all times to do its work from month to month and at temperatures from 100 degrees F. down to zero, where its output may be reduced 50 per cent.

It must also be designed to require very little attention, to be easily kept in good condition and to withstand jolts and jars such as are experienced in an automobile.

Construction of Battery.

Fig. 2 shows, in section, one cell of a Prest-O-Lite Storage Battery with part of the jar cut away to show the interior. The Prest-O-Lite cell jar is made of hard rubber, which not only provides insulation, but also resists the action of the acid solution which it must contain.

Plates are immersed in the acid solution (called "electrolyte"). The "positive" plates are connected in one group, and the "negative" plates in another. These plates are fitted in close together, separated by thin strips of wood fibre or similar material, and are so arranged that the "positives" and "negatives" alternate. Each plate consists of a framework of lead alloy, holding a mass of porous (or "active") material.

There is no "electricity" in a fully charged storage battery, simply a chemical condition which will produce electricity.

"Charging" a battery, by passing electric current through it causes a certain chemical action. The

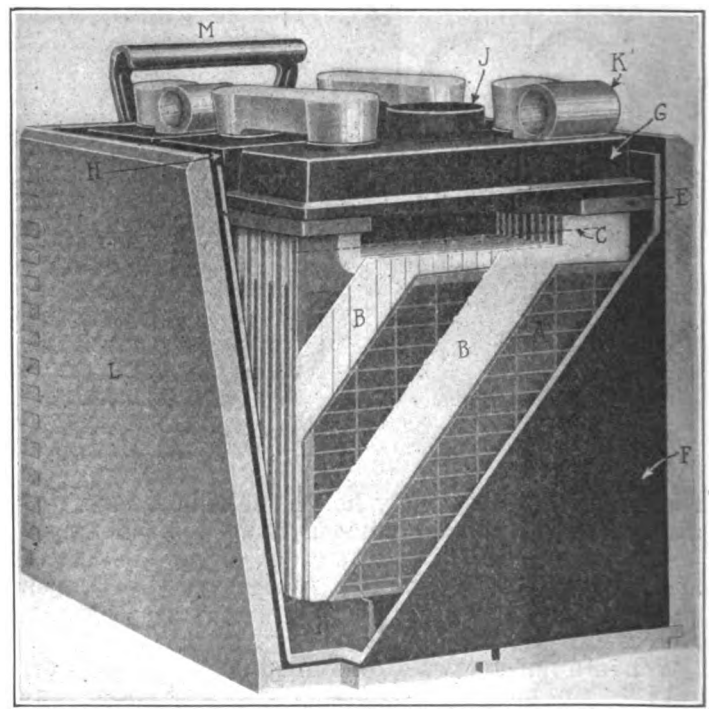


Fig. 2.—Sectional View of Prest-O-Lite Storage Battery.

battery thus "charged" is constantly striving to get back to its original condition, or "discharge" itself, and it is this chemical re-action which produces and gives off electric current.

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In Fig. 2 the various parts of the battery are lettered as follows:

A. Plate combination.
Positive plate is chocolate color.
Negative plate is slate color.

B. Separators.
Carefully selected wood of extreme porosity or rubber.

C. Electrolyte level.
¼ inch above tops of separators.

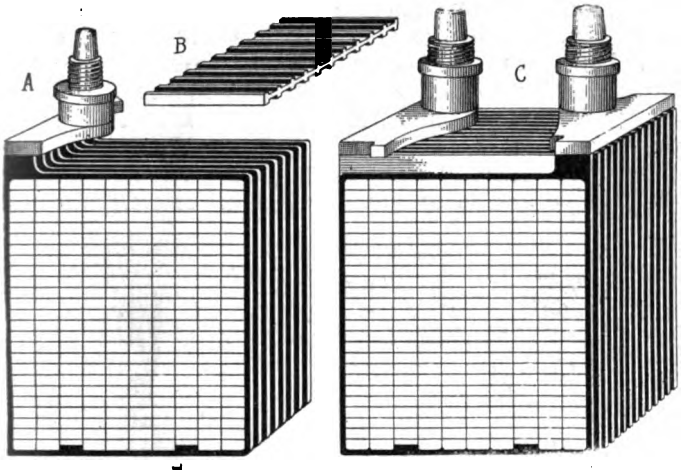


Fig. 3.—A Group of Plates at A; A Wood Separator at B; and An Element at C.

D. Bridges for plate support; positive and negative elements rest on bridges.

E. Plate connectors.
Made of substantial rugged design.

F. Hard Rubber Jars. Special Composition.
Hard rubber, tested to 24,000 volts, and rigid mechanical test.

G. Jar covers, allow expansion and overcome slopping of acid.

H. Sealing compound. Composition of high elasticity and acid resisting qualities.

J. Filler openings for filling with distilled water.

K. Terminals and cell connectors. Are made large to prevent heating.

L. Hardwood box. Selected hardwood painted with a preparation to resist acid.

M. Handles, stamped and pressed from heavy sheet metal, lead plated and enameled.

The Willard Battery positive plate grid is filled with peroxide of lead and is of a dark brown color. The negative plates are dull gray and the active material is soft, spongy lead. There are a great many varieties of oxides of lead and it is very important to select oxides that are free from impurities and have a certain density and weight for their bulk. The Diamond Grid used in making the plates of the Philadelphia Starting Battery is so designed as to equalize the strains set up in the plate by the expansion of the lead sulphate and prevents the plate from buckling. Buckling leads to short circuiting of the element and rapid deterioration of plates. The active material is carefully compounded and is applied to the grid by hand.

The positive and negative plates in exide starting and lighting batteries are of the same general design as exide plates used in vehicle batteries. A grid made of a stiff lead alloy supports the active material in the form of a series of vertical strips held between the grid bars and locked in place by horizontal surface ribs which are staggered on the opposite sides. After the grids are cast, they are "pasted" with oxides of lead made into a paste of special composition, which sets in drying, like cement. The plates then go through an electro chemical process which converts the material of the positives into brown peroxide of lead and that of the negatives into gray spongy lead. Both the positive and negative plates are provided with an extension or "lug" and they are so assembled that all the positive lugs come at one side of the jar and all the negative lugs at the other, thus enabling each set to be burned together with a connecting strap, giving one positive and one negative pole. The burning is usually done by a hydrogen flame, which melts the metal of both lugs and strap into an integral union.

A set of plates burned to a strap is known as a "group," A, Fig. 3, either positive or negative. The straps are made of a hard lead alloy and are provided with posts to which the cell connections are made.

Separators.

When the positive and negative groups are assembled together, the adjoining plates are kept out of contact by means of wood separators ribbed on the side against the positive. The separators, Fig. 3, B, are made either of tough wood particularly adapted for the purpose and given a special treatment to remove harmful substances or of hard rubber.

A special type of separator is used in the Willard Battery, 196,000 white threads pierce the rubber plate insulation and each one is 1-32 of an inch in length and of such small diameter as to be practically invisible to the eye. This insulation is used to keep the plates from coming in contact which would cause a short circuit. However, the insulation at this part of the circuit must be porous. The battery solution is drawn through the threads by capillary attraction so there is always a full flow of energy to lights and starter. At the same time there is the durability of the rubber to preserve the life and efficiency of the plates.

A positive and negative group, together with the separators constitute an "element," Fig. 3, C. The fluid known as "electrolyte" is sulphuric acid, diluted with distilled water.

The cell container is a rubber jar of special com-

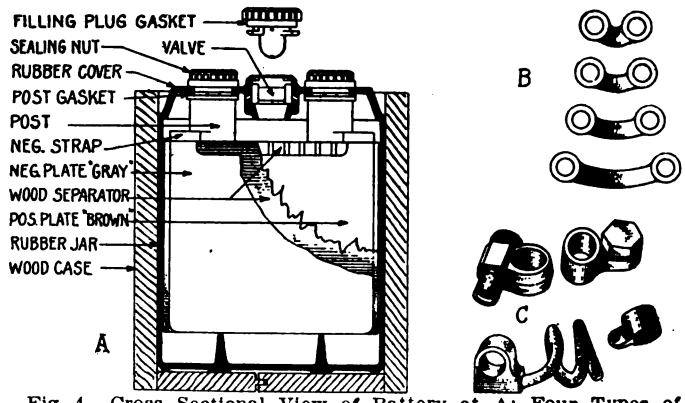


Fig. 4.—Cross Sectional View of Battery at A; Four Types of Post Connectors; and C, Four Terminals.

position which will withstand the vibration of the car and any ordinary handling without breaking. The plates rest on stiff ribs or bridges in the bottom of the jar (Fig. 4), allowing space for the gradual accumulation of "sediment."

The jar cover and method of sealing and venting

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represent a radical improvement over previous practice. The cover is flanged in such a way as to give a more perfect seal to the jar than the old flat type of cover, and each cell is a separate sealed unit.

A special feature is the method of making a tight seal where the post goes through the cover (Fig. 4). The strap post has an alloy collar which supports the jar cover, a soft rubber gasket being placed between. The post is threaded where it comes through the cover and the sealing nut clamps the cover tight, the soft rubber gasket underneath giving a very effective seal.

The Electrolyte.

The solution or electrolyte consists of a mixture of pure sulphuric acid and distilled water. Acid of 1.835 specific gravity is used and is slowly and carefully poured into distilled water in a glass jar and stirred with a glass or wooden stirring rod until a specific gravity of the solution of 1.300 is obtained as shown by means of a hydrometer, the gravity being corrected one point for each three degrees change in temperature above or below 70° F. For the convenience of the user, a thermometer has been designed with a special scale on which the amount of correction is indicated. After the battery is in service sulphuric acid should never be added with the distilled water unless some of the electrolyte has been spilled, as the amount of acid in the cell must remain unchanged.

Connectors, used between posts in connecting cells in series must be heavy enough to carry the heaviest current discharge required from the battery, see Fig. 4.

There are various types of terminals used with starting batteries. Some use a flat lug and others a round tapered plug, as shown in Fig. 4.

Chemical Action.

During the charging of a storage battery the following effect takes place:

At start: $PbO_2 + H_2SO_4 = PbSO_4 + H_2O + O$.

At finish: $Pb + H_2SO_4 = PbSO_4 + 2H$.

and as it gradually discharges it acts as follows:

$$PbO_2 + Pb + 2H_2SO_4 = 2PbSO_4 + 2H_2O.$$

In these the letters mean as follows:

Pb = Lead.	H = Hydrogen.
O = Oxygen.	$PbSO_4$ = Lead Sulphate.
H_2SO_4 = Sulphuric Acid.	H_2O = Water.

When a cell is put on discharge the current is produced by the acid in the electrolyte going into and combining with the lead of the porous part of the plates called "active material," producing lead sulphate. This sulphate fills the pores of the plates preventing the free circulation of acid and causing a drop in voltage. If a fixed current is taken from a cell which will discharge it in 8 hours, the terminal voltage will be about 1.97, dropping gradually to 1.9 in about 6 hours. After this it drops more quickly to 1.8 and at last rapidly to 1.75, when the discharge should be stopped. If the discharge current is cut off the voltage rises almost at once to a figure nearly as at the beginning of discharge. If the gravity of a fully charged cell is 1.300 it will at the end of discharge be about 1.150.

Charging is the reverse of this process. Direct current is passed through the cell in the opposite direction, reversing the chemical action and restoring the acid to the electrolyte and the lead and lead oxide to the plates.

STRATTON SEMI-SEDAN.

Every day we read in the trade papers articles telling of the big amounts various people pay for converting their Ford car into another model. Not long ago a western man expended over $8,000 to make a racing car of his Ford. This simply goes to show that the Ford car is a great favorite among those owners who have the money to spend for a larger car, but prefer the smaller and lighter car.

Many people admit that the Ford, as a machine, is an excellent proposition, but do not like the body lines, and so hesitate to buy the "universal car." For this class of people the Stratton Semi-Sedan type of body, made by the Stratton Motor Car Company, Webster building, Chicago, Ill., has been designed.

As the illustration shows, this body is wholly distinctive and is unquestionably different from the



THE STRATTON SEMI-SEDAN

conventional type of body. From the front to the rear, the body is of streamline design, but has no curves. Every line is sharp and smooth, and one is strongly reminded of a swift racing boat, with a torpedo stern.

To apply this body, the Ford chassis is extended 30 inches, giving a total wheelbase of 130 inches, and producing an easy-riding car. The body is designed for four passengers and is finished in a baked-on enamel. The standard body is cream color, but at a slight additional price other colors may be had.

One of the features of this body is the semi-sedan top, which is supported on six posts and fitted with quick-fastening side and back curtains. At the present time the manufacturers are designing glass windows to take the place of the curtains for converting the car into a limousine for winter weather.

The body inside is extremely roomy and is upholstered in green imitation leather, called DuPont's Fabricoid. With the body is furnished a Stewart vacuum tank, with pipe and connections so that the fuel tank may be placed at the rear of the car.

Many New Positions Open.

The branch office of the Inspection Division, Ordnance Department, 600 West Jackson Blvd., has immediate need for two hundred fifty to three hundred inspectors. At the present time positions of inspector of field artillery ammunition and inspector of carriage division are open. Both these positions pay a salary of $3.50 to $5.00 for an eight-hour day and time and one-half overtime. These positions are in the vicinity of Chicago. It is anticipated that many more examinations will be opened up immediately. Female applicants between the ages of twenty-one and fifty, male applicants between the ages of thirty-one and fifty will be considered.

Applicants are especially needed who have had

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artillery ammunition, carriage, motor, small arms or small arms ammunition experience. There is immediate need for the services of these inspectors and applicants are requested to report to Mr. Becker, 600 West Jackson Blvd., Chicago, Illinois, for interview and application blank.

N. A. A. J. ANNOUNCEMENT.

At the Virginia Hot Springs Convention of the National Association of Automobile Accessory Jobbers, the Board of Directors by practically a unanimous vote will bring forward a number of recommendations as follows:

First:—That the annual meeting be held the last week in October rather than in January.

Second:—That at the annual meeting in October they hold an accessory show which would afford the jobbers a chance to see the latest inventions and enable them to secure illustrations, lists, etc., for their catalogues.

Third:—That the sessions of the convention be held from 10 a.m. to 1 p.m. and adjournment then taken.

During the forenoon only dealers will be admitted to the exhibition; and at 12 o'clock exhibitors, manufacturers, jobbers and their aids.

The full text of this announcement may be obtained by writing the National Association of Automobile Accessory Jobbers, 1813 City Hall Square Bldg., Chicago, Ill.

Commercial Ford Body.

The P. J. Murphy Company of Minneapolis, Minn., through their factory representative, C. L. S. Holmes, 702 Boston Block, Minneapolis, Minn., are marketing a special Ford body, which is illustrated herewith, and which seems to be of a unique as well as interesting design. When closed the body gives a general appearance of a Ford roadster and is arranged so that a spare tire may be carried on the top of the cover, with a lid which opens inside the tire, permitting access to the rear compartment. To form a truck, the entire back cover is swung backward, permitting one to slide out a telescoping steel box, which engages under the steel strap across the inside of the cover. With the back open, the truck body is exposed. When used as a truck, the loading space measures 32x69 inches and has a carrying capacity of 1,800 pounds. The steel used in the construction is of 16-gauge and heavy enough to last for the life of the car.

This body should be of great interest to the garage owner as well as to small business concerns who have need of light trucks for carrying varied loads. These bodies are made to fit the rear platform of any model Ford car and may be attached in a very few minutes.

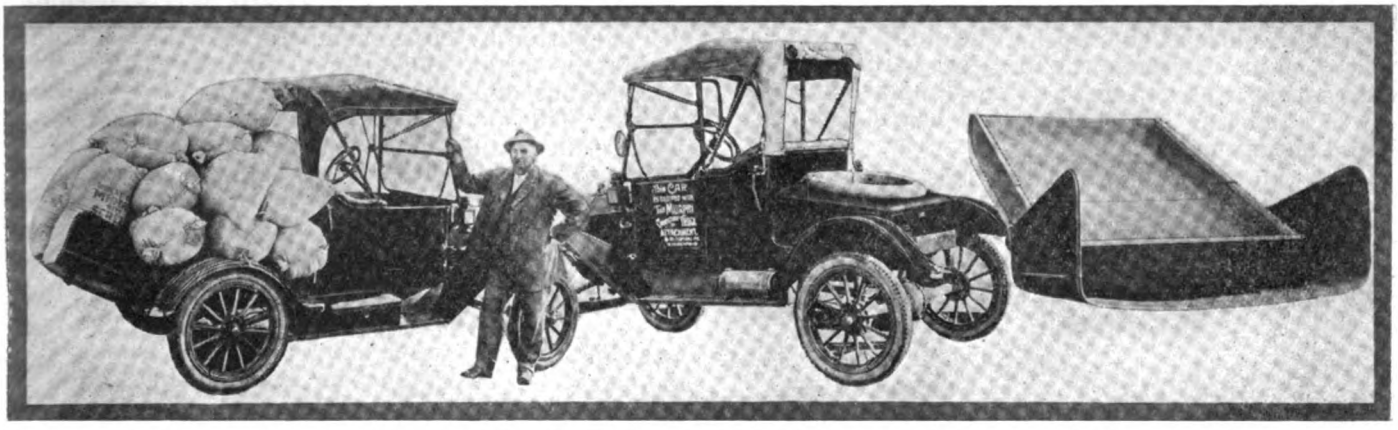
When in the Mud.

It is a natural impulse when the car stalls in soft going to jam down the accelerator to get all possible power from the motor. But if the car has stalled because the rear wheels cannot take hold in soft mud and are slipping around, this is not the best way out. The whirling wheels simply dig down deeper. It is better, after shifting into low, to let the motor run at comparatively low speed and edge the clutch in gently. This will give the rear wheels a better chance to take hold. Often one can get out better under these conditions if there is a load in the rear seat.

If the wheels continue to slip at slow speed, it becomes necessary to tie ropes about the rear wheels or to throw straw or brush under them. With a light car one can often help it forward by placing one end of a stout plank or pole under the rear axle and with the leverage thus gained lift it forward while another applies the power slowly.—Milestones.

A Big Carload.

A few days ago a carload of 600 crank shafts, all of which were ground, drilled and polished, was shipped to the Waukesha Motor Company, Waukesha, Wisconsin, by the Automobile Crank Shaft Corporation of Detroit. These crank shafts will eventually be used in engines for truck and tractor service. The average weight of each crank shaft was 80 pounds, thus bringing the total load up to 48,000 pounds and as each crank shaft was crated separately, the total weight of the crating and the shafts together, averaged considerably more than that figure. Under ordinary conditions crank shafts are shipped in less than carload lots and usually in lots of one and two by express, and this large shipment simply goes to show the present activity of the truck and tractor market.



Three Views of the Murphy Disappearing Truck Body. At Left, A Big Load of Wheat; How It Looks as a Passenger Car; and at Right, the Body Detached.

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Lining Up the Main Bearings and Removing Timing Gears

To Insure Satisfactory Engine Operation and Prolong the Life of the Machine, the Various Bearings Must Be Repaired With Care

BY J. N. BAGLEY

There is probably no part of a motor car that requires more careful attention than the bearings of the engine and the gears. Much care should be given them, however, for upon the bearings depends the usefulness of the whole machine. Almost every day we can see a car come down the road, or street, and above the rattle of the car one can hear the bearings knock. When the bearings are allowed to knock for any length of time they will become out of true and be thrashed out of their setting, allowing the polished shafts to come in contact with the rough metal holding the soft smooth bearing, and the result is a costly repair.

Repair Main Bearings.

In overhauling the engine one should begin at the crankshaft and take up every bearing. There are times when the bearings, especially the main bearings, get out of line, and to put the engine in good shape it will be necessary to line the bearings before adjusting them to the crankshaft. A very good plan is to make a test before attempting to make any adjustments, and by so doing save a great deal of time. Take a shaft of rolled steel, exactly the same diameter as the bearings of the crank shaft and rub over it a quantity of prussian blue, at the points where it comes in contact with the bearings when it is put in the place from which the crank shaft has been removed, as shown in Fig. 1, at E.

Now bolt the bearing caps B, C, D, down just tight enough so that the shaft can be revolved with slight pressure and turn it a few times. Remove the caps and note how much of the surface has taken the blue from the shaft. In case one is not able to judge the correct pressure of the caps on the shaft, it will be a very good plan to make the first test without placing the bearing caps and in so doing eliminate any danger of springing the shaft into a bearing where it would not lay naturally.

Scraping the Bearings.

After the bearings have been tested for alignment and found out of line, it will be necessary to either

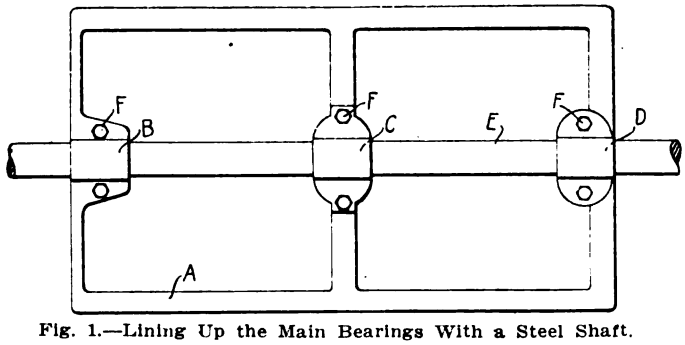


Fig. 1.—Lining Up the Main Bearings With a Steel Shaft.

replace the bearings with new, or with a bearing scraper, remove the high places, bringing the bearing in line with the remaining number. Many times scraping is not a good plan, for it entails the removal of a sufficient amount of the surface from the bearing to cause the gears to mesh entirely too deep. This results in wear and a constant hum in the timing gears. One must use judgment as to the amount of metal removed in this manner, and be sure to leave enough metal so that the timing gears will mesh correctly without grinding or howling.

During this work, the case, A, should be supported in a position so it may be repaired without standing or sitting in a humped position, or in fact any position that will cause one to be uncomfortable, for in this condition the mind is not given wholly to the work and little essential points will be overlooked.

After the bearings have been replaced or scraped so that they all are in perfect alignment, the crankshaft should be examined very carefully for defects, such as flat bearings, sprung throw or a flaw caused by a faulty connecting rod. A flat place on the bearing surface as shown at D, Fig. 2, must be repaired or reground, for it is impossible to keep a bearing tight in this condition. The rod may be adjusted so that it will fit perfectly on one-half of the bearing, but when it is turned one-quarter over, it will either be so tight that it cannot be worked, or it may be so loose that it will knock. At the present time crank shafts are so reasonable in price that it is not a good policy to place a shaft that is flat on the bearing surface in an engine. Then again at A, in Fig. 2, we have a part that many times becomes sprung, owing to the fact that a rod has come loose while running and when the shaft turns over, with considerable speed, it strikes the loose rod, knocking it against either side of the crank case, and if it comes against some part of the case that is quite well supported by cross members the crank shaft is liable to be sprung enough so as to bring the bearing surfaces out of line and make a very poor running engine. This defect can be determined usually by placing the crank shaft between the centers of a lathe and revolving it, trying it for trueness at several different points. In case it proves to be sprung at any point it should be replaced with new, for there are very few novices capable of straightening a twisted crank shaft so that it will give service again.

The Main Bearings.

In Fig. 2, we have a main bearing, showing the manner it is placed together holding the shaft, F, in position. We have at C the metal used for the bearing, usually babbitt or white brass. In case the bearing becomes worn to any great extent it will have a tendency to wear on two points and that on points exactly opposite one another. To adjust this sort of bearing remove the locking screws, B, and remove one or more of the shims at E, until the bearings fit. Now that the main bearings are adjusted and the shaft is ready to place it will be a very good plan to fit each of the connecting rods while the shaft is still out of the case. In piston 4, Fig. 2, there are two bearings, G, one on each side of the rod end, thru which the crosshead pin, called

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the wristpin, passes to hold the piston to the connecting rod, H. In case these bearings are loose, a very good plan is to replace the worn bearing at this point with new, for few engines have a satisfactory adjustment at this point, and besides, bushings are not at all expensive. The lower end of the rod, H, is supplied with a cast babbitt bearing, which can be taken up and scraped to fit the shaft, J, with little trouble. The bearing should be adjusted so that when the lower cap, K, is set snugly the weight of piston, H, will gradually draw the rod down very slowly. This is about the proper tightness for the

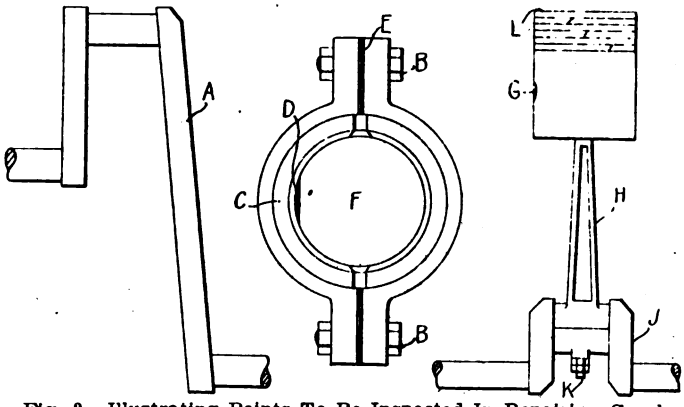


Fig. 2.—Illustrating Points To Be Inspected In Repairing Crankshafts, Connecting Rods, and Bearings.

connecting rod bearing. One should not overlook making the nuts secure on the connecting rod cap bolt, K, for if these become loose they will play havoc with the engine.

Fasten Caps Securely.

The caps holding the bearings in place, as shown at F, Fig 1, and K, Fig. 2, should be securely fastened before attempting to place the engine in the car. Many prefer to use cotter pins, but a very good plan is to tie the bolts together with a piece of tough wire, for in most cases the studs are screwed into the case, which is usually softer than the nuts on the outer ends of the studs, and if a cotter pin is used to prevent the nut from working off, the entire assembly of stud and nut and pin might work loose and come out.

Many times one will experience quite a little difficulty in removing the gears from the different shafts about the engine, but if a wheel puller is used, something on the order of those illustrated in Fig. 3, there will be very little difficulty in removing the gears. In the first sketch, we have a very simple gear puller, which consists of a yoke of steel, C, into which is screwed a pusher bolt, E, and a couple of lips, D, bent on the ends to lock over the gears, A. Now, by turning the bolt, E, the gear is gradually pulled from the shaft, B, with little trouble. In case the gear is hard to start, when one thinks the proper amount of pressure has been applied to the screw, it is a very good plan to strike a gentle blow with a hammer on the end of bolt B, and with the pressure already applied, the wheel or gear will slip.

A Useful Puller.

Another and very useful puller is made as shown in the same figure at the right. This particular puller can be used for pulling a number of different sized gears and is an idea worked out by the writer. The plan is very much the same as the first one described, except that it has some advantages not found in the plain puller. This device consists of a bar of steel, G, into which is screwed a bolt, F. Each end is slotted to allow the pulling arm to be bolted in at H. The arm has a number of holes drilled to allow different adjustments and to accommodate different sized gears. The upper end of the arms at J have set screws which will prove valuable in many instances in preventing the arm, K, from slipping from gear, M, while it is being pulled from shaft, L. By tightening the screws, C, in each of the arms, they cannot spread at the bottom and come off, as they often do without the set screws.

In assembling the different parts after the necessary adjustments and repairs have been made care should be taken that every chance of a leakage of oil should be taken care of. All gasket surfaces should be thoroughly cleaned and all the old gasket material, as well as all cement, etc., removed. Prepare the new gasket and stick one side of it to the case and note that all corners are filled with a clean, fresh gasket so that when the lower half is placed in position it will be absolutely oil tight. Oil costs money and should not be wasted, but not only this, a leaky case is dangerous, for it is impossible to tell just exactly how much oil is in a case and how far it will run before new oil should be added.

Examine Flywheel.

The flywheel should be securely fastened to the crank shaft, for in case it has once worked loose it will seldom stay tight afterward, owing to the fact that flywheels are machined to fit very closely, and a little working from time to time will wear the inner hub bore, until it fits loosely. Sometimes the shaft to which it is fastened becomes worn sufficiently so that it is next to impossible to keep the wheel tight. A loose flywheel will cause a deep and heavy knock much resembling the knock of a rear main bearing and is hard to locate oftentimes, unless one has had some experience with loose flywheels.

When roller bearings are worn sufficiently to make an excessive looseness it will be necessary to replace with new, for there is very little chance of adjustment, unless a new sleeve will serve the purpose. Ball bearings can be repaired much better than roller in some instances, for over-size balls may be supplied in place of the old ones, in case the cones and cups are in good condition and not worn or cracked. In case the ball bearings are of the annular type it will be necessary either to replace with new, or send

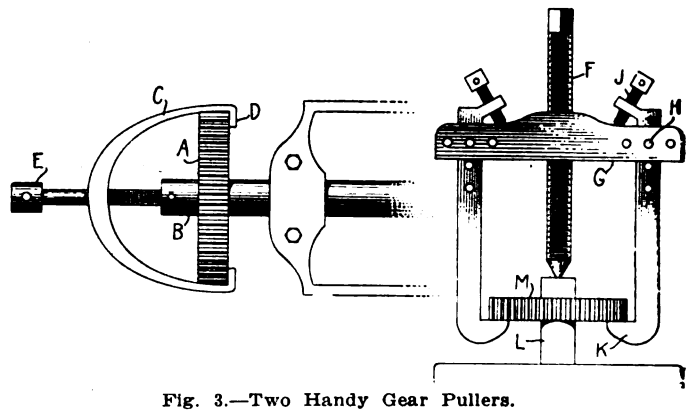


Fig. 3.—Two Handy Gear Pullers.

them to some one having the necessary equipment to regrind them.

Camshaft Bearings.

The camshaft bearings will require attention at the time the overhauling is done, for worn camshaft bearings allow the camshaft to back off from the push rods under the strain of the valve springs and

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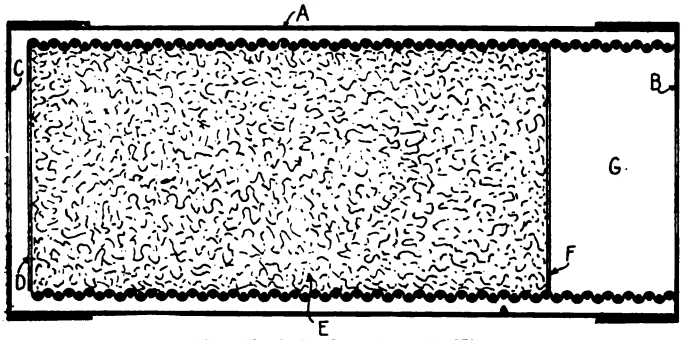
the valve action will be affected to quite a little extent, thus resulting in a direct loss of power. The valve lift is not sufficiently great to stand any great amount of waste and still perform its function correctly, therefore it is necessary that the lift of the valve should be kept as near as possible to the standard as figured by the engineer designing the engine. The space between the valve stem and push rod should be adjusted very closely for a two-fold purpose; to give the maximum power and to eliminate the noise that comes from looseness at this point.

CARBON FORMATION.

Accumulations of Dirt and Dust Are Often Wrongfully Termed Carbon Deposits.

In our last issue we considered the heavy fuel problem, which is bothering the owner to-day, and one of the results from the use of this fuel we find to be carbon deposits in the firing chamber.

Now, heavy fuel is not the only item which makes for carbon formation. Many engineers throughout the country have disagreed as to the main reason for the accumulation of carbon in the cylinders, and many of them seem to think that the carbon actually formed by the burning of fuel and lubricant is of minor importance. The real formation is a dirt and dust base, rather than a strictly carbon base. If we consider this as a fact, and undoubtedly dirt plays an important part in the formation of carbon, let us consider the various ways in which dirt might enter



A Practical Carburetor Air Filter.

the explosion chamber and the methods to use in preventing this entrance. Very little dirt can enter through the fuel line and usually where dirt enters in this way the carburetor action is impaired and the engine does not function properly, for the fuel passages are usually small and do not permit the passage of large particles.

Dirt Enters Air Intake.

Much of the dirt which finds its way into the cylinders enters the manifold through the carburetor air intake. This sort of dirt is usually composed of road dust, fine sand, and road oils, and when one stops to think of the amount of dust on the ordinary street one wonders why the automobile engine of to-day stands up under the strain as well as it evidently does.

If anyone doubts the statement of the engineers, when they tell of the entrance of dirt through the carburetor air intake, let him examine the inside of the automobile dustpan. Let him clean out the dust pan thoroughly with kerosene oil and run the car over average roads for a distance of one hundred miles and then examine the dust pan again. He will probably find dust accumulations which may have a thickness of 1/16 of an inch, thus proving that even though the carburetor is protected to a certain extent a great amount of dust passes through it while it is being operated.

Aside from the fact that this dust causes trouble from carbonizing, it has much to do with the wearing of the cylinder walls, and when taken into consideration with the heavy fuel problem, offers the solution for rapid engine destruction. Every car owner should do his best to prevent the entrance of dirt and dust into the carburetor and should he not be able to afford a manufactured air filter, he should make one himself.

Home Made Filter.

Obtain a length of small stove pipe, A, about three and one-half inches in diameter and about eight inches long, and fit both ends, B and C, with covers. These covers may be obtained from cocoa, coffee, or other large cans. Through each cover bore or cut a hole about one inch and a half in diameter. The one at B should be just large enough so that it will slip easily over the carburetor air intake or over a tube attached to the air intake. Now take a piece of coarse wire mesh and bend it into a cylinder as shown at D. This cylinder should be soldered to the cap, B, its whole circumference, and should be about three inches in diameter. At F a partition should be made by passing or weaving a number of fine wires through the cylinder, and the space E filled with steel wool, which has been pulled to pieces and packed in very lightly, so as to leave an open passage for the air. After the steel wool has been put into place the end D should be covered by a piece of coarse mesh, such as used for the cylinder. The chamber shown at G should be about one and a half inches in length. The cylinder should then be covered with one thickness of coarse cheesecloth and the cover C put into place. At any time the cover B may be removed, taking with it the cylinder and its steel wool filter, the end D removed and the whole cleaned very readily. To prevent the formation of rust in the steel wool, the wool should be dipped into lubricating oil and allowed to drain for a period of an hour or so. Every two or three hundred miles the apparatus should be cleaned, and one will be surprised at the amount of dirt that the little device collects in the course of a season.

BIG BUSINESS POSSIBILITIES.

Albert Champion Talks to New England Jobbers and Summarizes Present Trade Conditions.

At the last New England accessory jobbers' dinner, Mr. Roy LePellatier gave a dynamic talk on the healthy condition of the automobile business and the big possibilities in all its branches. Following Mr. LePellatier, Mr. Albert Champion, president of the Champion Ignition Company, gave an interesting speech which is quoted in part as follows:

"My main object," Mr. Champion said, "in asking you to join me here is that you might become better acquainted with each other as a better understanding will result in better business relations.

"I attended a luncheon yesterday at which Mr. Alfred Reeves spoke to five hundred dealers, urging them to join the New England Dealers' Association in order to bring them into closer relationship with each other. He outlined all the benefits to be derived from co-operation and cited this instance for comparison; The National Automobile Chamber of Commerce, of which he is manager, owns over 600

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automobile patents and any manufacturer who has been in business for a minimum of one year, operating in a successful and legitimate manner, can join the Chamber of Commerce and get the benefit of all those patents. This has been a very great factor in making the automobile business successful. Just consider for a minute the condition of the industry if each manufacturer owned a few patents and all were continually fighting each other. Fortunes would be spent in litigation and the industry could never have grown, as capital would have been scared away. No one can deny the success of the automobile industry and this condition applies to you as well as it does to the automobile manufacturers.

An Improvement in Attitude.

"I am glad to state that I have found a marked improvement in the attitude of most jobbers towards their competitors. A few years ago when calling on jobbers I would hear so many grievances and so much 'knocking' that I wondered at times why these firms stayed in such a business themselves. Getting together is undoubtedly what has helped, as not only you get acquainted, but you can stop many evils that are detrimental to your business. For instance, you will find on the jobbers' shelves special brands of goods and lines for which there is no demand but which have the doubtful merit of being cheap, and when it is pointed out to a jobber that it is impossible for him to build a satisfactory business with that class of goods, as even if he does sell them the dealer will be 'stuck,' most of them will answer: 'I know it isn't good; I also know there isn't any demand but our competitor has a cheap line, is handling a special brand and we must have something to meet that competition.' That kind of competition isn't doing the jobbers any good. It simply results in raising their cost of doing business, due to the small percentage of profit they make. The goods must be sold cheap and in many instances gotten rid of below cost. While this hard work is being done to salvage as much as possible from the original investment the quality lines are being overlooked as all attention is given to these cheap lines.

"The successful automobile dealers today are the ones that handle good automobiles, and the successful accessory dealers are the ones who handle good accessories. If you are going to build up your business on the right kind of basis you will have to think of the dealers. If you are going to give him advice or suggestions regarding the lines he should handle don't hand him a job lot article or an unknown brand that he cannot sell.

Obtain Customers' Confidence.

"The only satisfactory way to build up business is to earn the confidence of your customers. Confidence will bring dealers to trade with you just the same as you personally go to the merchant in whom you have confidence, whether it be a grocer, shoe store or your tailor. The success of the accessory business is in your own hands but you can only make it successful by handling quality goods. The lines should be selected carefully and you should investigate the methods of the manufacturer you are dealing with.

"I wish to touch on the subject of your sales organization. It is an excellent idea to give the salesmen an opportunity to check up their own work by furnishing them periodical reports of what they are doing. How are we going to bring the accessory salesmen up to the highest standard? I believe that the management and salesmen should have meetings and 'get together' frequently as in such meetings experiences can be compared, customers can be discussed, the salesmen can express their opinions and relate what they may be 'up against' in their particular section. In these meetings the management has the opportunity to inspire the men with confidence by helping them and letting them help each other; by not merely telling them 'go out and sell this,' but by asking their opinions and letting them realize that they are an important part of the business, as no jobbing firm is better than its selling organization and confidence is what makes success possible.

Read Trade Papers.

"Another important matter is to read the trade papers. Keep posted on what the automobile industry is doing; read the articles that are written by merchants expert in the handling of accessories; take out subscriptions so that each one of your men will receive a trade paper at home. Possibly they do not think of buying trade papers or just buy one once in a while. Every salesman is trying to better himself and they will find automobile trade papers a great help.

"With the right kind of goods, well organized selling forces and good service, you will undoubtedly increase your volume of business and increase the business of your dealers. This increase means lower cost and reduction of cost means higher profit. Volume is what makes big profit and the best illustration I can think of is the Ford Motor Company. A short time ago, on account of taking on war work and reducing their output to about 50 per cent. they have to increase their selling price $93.00 per car which means an increase of 24 per cent. Just think of it! The same condition applies to your business. If you can make your volume great enough, you will be on the same basis as Ford who only had a very small overhead per car. Consider that to-day their increased overhead must be at least $80.00 per car. Of coure we realize that you must have the right percentage of profit to start with but there is only one way to increase that profit and that is by reducing your cost through volume.

Carry the Right Stock.

"The question of carrying the right stock is just as important for the dealer as it is for you, as in getting them to carry a complete stock of the best lines you are making it possible for them to take care of their customers. You are giving them goods that move and make money. You are making them a good credit risk because you are helping them to become successful accessory dealers. The dealers need your advice and those who are willing to accept it do so because they have confidence in you. If they have confidence in you, you should justify it by giving them the right kind of advice and keeping that confidence."

Army Motor Trucks Arrive in New York.

What was probably the longest train of government motor trucks ever seen in New York City arrived last week, in charge of Major G. F. Bailey, one of the oldest motor truck commanders in the United States Army. The truck train left Buffalo three weeks ago and came to the city by way of the Boston Post Road and Pelham Parkway from Connecticut. The train carried several hundred tons of supplies and was accompanied by a motor truck tank containing a supply of fuel.

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An Interesting Camping Trip to Florida

One of Readers Relates His Experiences in His Two-Thousand Mile Trip and Tells How He Constructed a] Camping Outfit

BY E. S. PURDY

The writer and his wife, all there are in the family, together with the little black dog "Coalie," have just completed an automobile trip of over 2,000 miles from their home in Amsterdam, Mo., to Brodentown, Fla., on the west coast south of Tampa.

We camped every night, rain or shine, and it was mostly rain, never had a cold, never a moment's

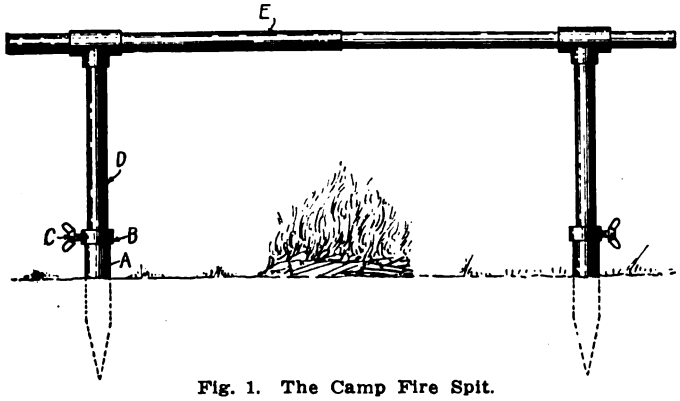


Fig. 1. The Camp Fire Spit.

sickness, never before had such appetites and never before slept so soundly at night. We loafed on the way, taking two months to make the trip, the engine never missed an explosion all the way, and the only repair made was to a broken leaf in a front spring. When I further add that my wife is nearly an invalid and never slept anywhere except in a warm bed, I consider the trip a remarkable one. We came here to escape the rigor of our northern winter.

The automobilist who only drives around on the boulevards and paved streets of his city, or perhaps gets out in the country a short distance, has no conception as to the number of people with cars who are going everywhere and camping on the way. Visiting relatives in other states, sight-seeing across the continent, each one following his own ideas as to equipment, and we met them by the scores, with trailers, with tents, bags and baggage piled all over the car and hung from anything solid enough to hold; traveling by automobile means a happy, carefree, healthy life, out in the open and close to nature.

While the writer had a camping trailer with him and actually lived as comfortable as at home, this article is written for any suggestions it might contain for the man who wants to go and take the family, but cannot afford to incur the expense of a trailer and does not care to take three meals a day at the hotels and restaurants in the towns through which he passes.

Since meals at present vary from 50 cents for but little to $1.25 for a satisfying meal, and a party might consist of two adults and from one to five children, three meals a day means a heavy expense.

The camping subject is too large to admit the discussion of all features, so this article will deal with the cooking and meal question only.

I may now consider myself a veteran, but if anyone ever was green I certainly was when I got my first lesson from my good friend Charley Beall, a royal fellow, social, intelligent, thoughtful, brave, sympathetic and true as steel. At the time he and his family, myself and my wife were fishing in the lakes of Minnesota. We took what we called a raw lunch with us for dinner; that is, uncooked food. Our equipment was what we obtained at the hotel and consisted of the food, dishes, a battered coffee pot and the regular short handled skillet. Now if you have ever fried bacon, eggs, or potatoes over a camp fire with a short handled skillet, you know how hot your face got, how your hands burned, how the smoke rose into your eyes and a lot of other things. So right then and there I determined to devise and construct an outfit that I could cook with in comfort and that would be light, small, compact and portable, for the first mistake a beginner makes is to burden himself with too many things which make too much of a load. So I determined to make a careful study of the subject and construct an outfit I could carry by hand if necessary, and which would occupy but little room in an auto or boat, but yet be varied enough to answer all requirements.

Cooking Frame.

I will attempt to describe how I built my cooking frame, shown in Fig. 1. I took two pieces of gas pipe, A, each 2½ feet long, heated the ends and hammered them to a dull edge like a chisel. Upon the other ends I put a band of iron, B, measuring ¼ inch thick and ½ inch wide. These bands around the ends made the posts solid so that they could be pounded, and the chisel edges made them easy to drive in the ground. Through the bands and the pipes I had holes cut and threaded and thumb screws put in, as shown at C. Then I obtained smaller

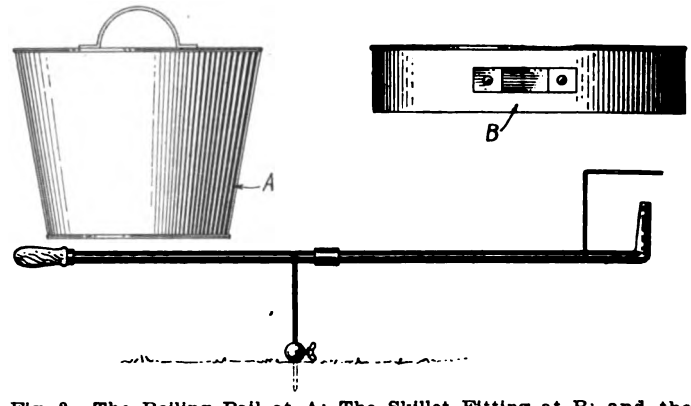


Fig. 2. The Boiling Pail at A; The Skillet Fitting at B; and the Skillet Holder.

pipes, D, that would go inside the larger pipes and on one end had a pipe, T, threaded. So you see I could put the small pipe inside the larger one, set it any height desired, turn the thumb screw up

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tight and make a solid fitting. Then I obtained two other pieces of pipe, E, of equal length, one telescoping the other, so when pulled out, but still supporting each other, they would be four feet long.

This is the way it is used in actual work. The chisel edge is driven into the ground far enough to make it reasonably solid, but not so far that it will

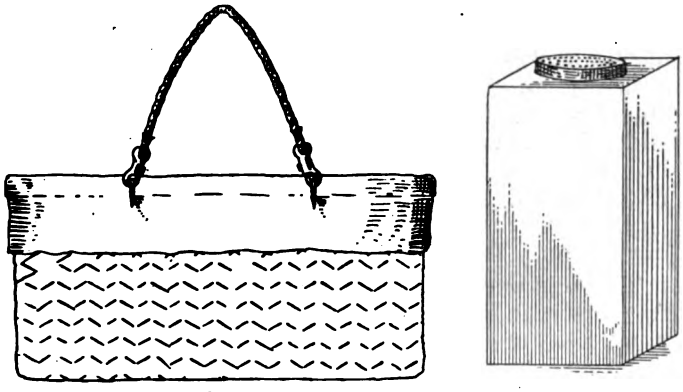


Fig. 3. The Camp Basket and Salt Shaker.

be hard to pull out. In this I put the smaller gas pipe with the T on the end, set it the height I desire and turn the thumb screw tight. I had the wings of the thumb screw big enough so I could obtain a good purchase; I then set the other standard about three feet from it and take the two pieces of telescoped gas pipe, put one end through one T, draw out the inside pipe and put it through the other T, leaving the smaller pipe in the larger far enough to sustain the weight required. So my cooking frame set up for use looked like Fig. 1. On the cross piece may be hung the coffee pot, a pot to boil potatoes, tea kettle or any other cooking utensil. By having the uprights telescope one can raise the cooking utensils, should the fire become two hot, or if it should be too small the cross piece could be lowered, bringing the cooking utensils closer to the blaze. One cannot always have a level place to camp, and if on a hill one side can be raised and the other lowered until the cross piece is level. Again, when in the open one might want a second cup of coffee, possibly a third, for open air is a medicine that gives one an appetite. By the time one has cooked the meal and eaten part of it the fire is quite low, and to be sure that the second or third cup of coffee is hot, the cross piece is lowered so the coffee pot rests on the embers. Never set the coffee pot or any vessel on the fire unless supported some way, for if you do, some piece of wood will burn down and your coffee pot will tip over, then there will be no second or third cup, and maybe no first. Now as to the way I pack this device. I push the small pipe of the cross piece into the larger, loosen the thumb screw in the two uprights and drop the small pipes into the larger. I now have three short pieces, which I roll in a canvas the right size and buckle a strap around them. I use the canvas because soot gets into the pipes and dirt adheres to the ones driven in the ground, but when rolled in canvas and strapped there is no danger of soiling anything else by contact with them. An outfit might be made still lighter in weight by having the inside section of the upright made of solid iron and the lower section smaller pipe, and the same with the cross piece. I have both kinds, but the light one bends too much under load and sways more than I like, so I use the heavy one.

Now as to the method of suspending the cooking utensils from the frame over the fire. Take wire sufficiently strong to sustain the weight and bend it into shape like a letter S. Make enough of these to suspend all the vessels from the frame clear down to a low fire. Make some of them long, some medium, some short, so that by hooking various lengths together you can secure any required length.

For a dish in which to boil potatoes, eggs or any other eatables, obtain a bucket of the size required for the party. As there is only myself and wife in my family, we use a two-quart pail. Don't get tin or anything that is fastened together by solder, as the heat of the fire will melt it, and the bucket, coffee pot or anything else will come apart. We use granite ware. Now, lids on all buckets and coffee pots fit too closely, so I took the rim off the lid of the bucket I used and had another put on. The new rim is wider and with a very decided inside pitch. Lids usually have knobs with which to lift them off. I had the knob taken off ours and a half ring of rather large size soldered on in its place. The reason for these changes is that the fire, especially at first, is very hot and will make it very inconvenient for one to remove a close-fitting lid. With a vessel suspended over a hot fire, one cannot handle the cover at all with the hands, so I obtained a lightweight stove poker, with a handle made of coiled wire and cut the poker off to a convenient length, then bent a hook on the end. With this hook I can lift the bucket off the fire, or lift the lid when I want to see if the contents of the dish are done. The lid and bucket, fixed as I have described, would look like A, Fig. 2. Of course, all vessels to be suspended over fire must have bails and not handles. This cover as described applies to the coffee pot and all other vessels that may be used which are to hang over fire.

Skillet Holder.

Next come the skillets. I bought two large size steel pressed skillets, had the handles taken off close to the body, making them just round pans. Then on the outside, midway between the top and bottom, I had an iron loop riveted on like B, Fig. 2.

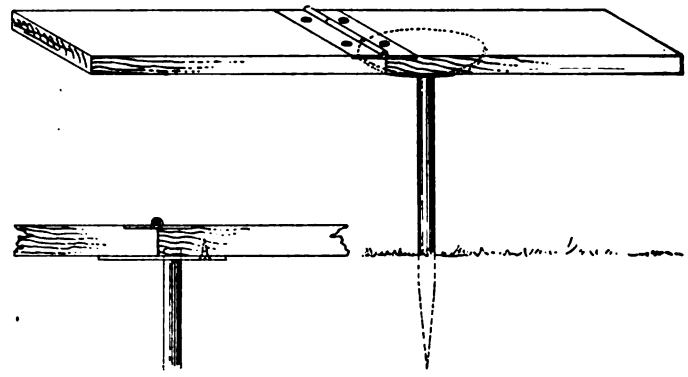


Fig. 4. A Handy Table for the Camper.

The opening in the loop was about ½ inch long and ¼ inch across. Next I had a piece of gas pipe flattened at one end and curved into a convenient shape for a handle and turned up at the end to fit into the

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iron riveted on the side of the skillet described above. Next I had a small hole bored in the flattened end of the gas pipe handle just above where it was bent to go in the slot on the side of the skillet. Into this hole I inserted a hook made of wire, with the ends turned at right angles, to go over the top of the skillet. This fitting was made very exact, and I had to use pressure to turn it over the skillet cover. The other end of the handle was threaded and a second piece of gas pipe, of the same length and size as the first, attached by a union. On the other end of the second pipe was fitted a wood handle. This, you see, now gave me a long handle, and I could hold the skillet over the fire, yet be far enough away so as not to get hot and uncomfortable. But the first season I found when the skillet was full of fried potatoes, or eggs, or anything else, it was pretty heavy to hold at that length, so I got an old wagon umbrella, took one of the braces and attached the hinged end to the center of my handle so that the rib hung pendant. When cooking in the skillet, this rib hung down and made a rest for the device. I found, however, that, in sand, the small rib of the umbrella would sink too deeply, so I obtained an iron ball about the size of an average marble, made a hole in it, fitted it with a thumb screw, and slipped it over the rib, a device which kept the rib from sinking in the sand. I had both handles and the attachment on the side of the skillet made all of a size, so no matter which part was picked up first, it fitted, making all parts interchangeable. With this arrangement the handles unscrewed, leaving short lengths which could be carried with the cooking frame in the canvas. The completed device is shown in Fig. 2.

Dish Basket.

The basket, in which I carried dishes and other things, was oval in shape and of a capacity about twice that of an ordinary market basket. I took off the handles and in their place, one-third of the way from each end, at the top, in the strong wood, I inserted screw eyes. Then I made two rope handles, and on the ends of the rope tied medium sized harness snaps. I next obtained a piece of oilcloth, big enough to cover the basket and reaching to the bottom. Where the rope handles were fastened I cut a slit in the oilcloth, so that the rope could pass through and snap in the screw eyes on the basket. With this arrangement the handles did not stick up in the way, and the basket was waterproof. On the inside of the basket I tacked pockets to hold soap and other small articles.

There are two kinds of dishes suitable for camping: aluminum or granite ware. I prefer the latter. I purchased cups for coffee, water, etc., that had flat bottoms, for they had broad bases and did not upset easily on irregular ground. I used a dozen plates and six cups. For vinegar, I carried a pint bottle, with a cork and screw top. Sugar was kept in a baking powder can. For salt and pepper I obtained two aluminum boxes with screw tops. The skillets I packed first in the bottom of the basket, then nested and packed the balance of the articles under the cover. I carried an oilcloth to be used as a table cloth. Automobile cushions make good stools to sit upon and keep one from the ground.

Refrigerator Basket.

For lard, butter, cream, ice water, etc., we had a refrigerator basket, several of which are on the market. These are very convenient, and we had ice water all day long, and everything kept fine. We kept condensed milk for our coffee in a corked bottle. Lard and butter was kept in small granite buckets holding a little over a pint. Spoons were of malaga tin, cheap but serviceable. We carried regulation knives and forks and a big butcher knife for general purposes. We liked good meals, and frequently carried jam, preserves and other dainties. In the side of the basket I also had a pocket in which I carried a safety hatchet. This device is a hatchet with a shield which folds back in the handle when in use and folds down covering the cutting edge when not in use. In the outfit I had also a lightweight, long wire toasting fork with open wire handle so it could be hung on the end of the cross sections to the cooking frame. This we used for toasting bread.

There is one more item which completes the outfit for automobiling. When cooking in the open one must use, of course, lard, butter, eggs and greasy knives, forks and spoons. If these are placed on the ground they are soon filled with ants, worms and all kinds of creeping things. To prevent this I had two boards, light but strong, measuring 15 inches long, ½ inch thick and hinged in the middle so they folded together one way and were self-supporting, the other giving a flat surface. On the under side, when open, I had a small, round iron plate fastened to one board only, but arranged so that the other board rested on half of it. In the center of the plate I had a threaded hole, into which was fitted a gas pipe of a convenient length, flattened one end and threaded on the other. I drove this standard in the ground, opened the boards, screwed the top on the standard or leg and had a little table on which I could place the lard, butter, egg dish, or cooking utensils. They were then out of reach of ants and worms. The standard I carried in the canvas roll and the top on the basket. The full equipment, then, consists of a small canvas roll, a refrigerator basket about the size of a 14-inch grip (not suitcase), a general basket of moderate size, containing a stove, dishes, etc. Practically all of the piping and fittings described, like the plate under the little cooking table, can be obtained at any well stocked hardware store.

I could go on and tell you of more things I devised for comfort and convenience when fishing in the lakes of Minnesota, as a boat has more room than an automobile for luggage if you are to ride in comfort, and if you can't have room in the seat and room for your feet, no use going; but this is an automobile magazine and would not be germain to the subject.

Neither have I said anything about sleeping accommodation en route. The chairs I use, the table I have, my recent 2,000-mile auto trip—that is a longer story than this one, too much to be included at this time.

In conclusion, I want to say that there are many stock outfits on the market designed for the same purpose as mine. I believe I have investigated all that gave evidence of any merit. Some have many good points, but all had features that an actual experience taught me were utterly impractical, but a trial of many years has proven to me that my outfit answers every requirement of camping, outing, vacation or picnic, whether on a hill or solid ground or in the sand.

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This department is maintained for the protection of our readers—especially our reckless readers, if we have any.
The object is to encourage every operator of a motor vehicle to be careful and avoid accidents, especially the inexcusable accident of a collision at a railway crossing.

In a few of the past issues of our magazine we have been running a department under the heading "Lessons for Drivers." At the suggestion of one of our readers we have ceased to look upon this department in the light in which we have heretofore seen it, and in the future intend to term it "A Life-Saving Department," for this is just what the Department is for. We want to bring home to our readers the many dangers which arise in the operation of an automobile. We intend to quote many actual instances of accidents, not in the spirit of criticism but to call attention to the different circumstances that make for danger.

Next Sunday morning, when you sit down to read the paper, count the number of accidents which you find reported, read them through and see how many of them could have been averted had you been in the place of the various drivers.

Careless Driving—Early this month, two innocent pedestrians were seriously injured when they were run down by a truck which had got beyond the control of the operator. The truck was running at a high rate of speed, and in turning a corner dashed from the road, through a pile of sand upon the sidewalk, hitting the men and then striking a post.

Driving on Left Side—An aged negro of Macon, Ga., was badly injured a short time ago, when he was struck by a taxicab, which was being operated on the left side of the street. The operator was arrested by the patrolman and arraigned on a charge of violating the rules of the road.

Roller Skates Cause Accidents—A lesson for parents as well as drivers is had in an accident which occurred near Memphis, Tennessee. A small boy who was on roller skates dashed from in back of a street car directly into the path of an automobile and had his skull fractured. The driver of the car, when he found he was unable to stop the heavy machine, tried to "straddle" the boy, so that the wheels would not run over his body, but was unsuccessful.

Ran Down Motor Cyclist—Last week at Salt Lake City, Utah, an automobile driven at a high rate of speed, in a reckless manner according to witnesses, ran into a motor cyclist who had stopped beside the road and was examining his machine. After having hit the man the driver of the automobile backed up his car to see what had happened, and hit the man a second time, crushing his ribs and fracturing his skull so that he survived but a short time.

Car Overturned—A big accident happened near Bridgeport on the first day of this month when a heavy automobile truck overturned at the top of a hill and seriously injured one passenger. According to reports the driver of the truck was startled by the sudden appearance of a heavy touring car on his left, and in trying to avoid the touring car, which cut in ahead of his own machine, the driver of the truck swerved to the right into a ditch and struck a stone wall. The driver and a second passenger of the truck were thrown clear of the wreck and escaped with minor injuries.

Reckless Driving—Ten soldiers from Camp Gordon, Georgia, were injured when a heavy motor truck operated at a high rate of speed ran into the ranks of the company.

Soldier Killed—A soldier was instantly killed and four occupants of an automobile narrowly escaped death in an automobile accident at the state highway near Beresford, California, when an automobile was overturned and entirely demolished. The machine was hit by a jitney containing nine soldiers, one of whom happened to be riding on the running board, and strange as it may seem, though the only person injured was the soldier riding on the running board of the jitney, the jitney was damaged but little.

Head-on Collision—Two drivers are today bemourning the fate of their automobiles which were entirely demolished near Houston, Texas, in a head-on collision. One of the drivers, despite the efforts of the police, cannot be located, while the other driver, who escaped without a scratch and was probably to blame, because he was driving on the wrong side of the street, is being held by the police.

Will Pay an Increase on Condition.

One of our subscribers, in replying to what we have been saying about an increase in our subscription rate, says: "I am even willing to pay $2.00 a year for The Automobile Dealer and Repairer if you will not discontinue the 'Lessons for Drivers.' I notice you omitted them in one or two numbers. I value the 'Lessons for Drivers' even more highly than the 'Trouble Department,' valuable as the latter is to most drivers. There is much to learn from these accounts of accidents. They make a careful driver even more careful. Do not discontinue this column. Rather give us more of them."

We have frequently been in doubt as to whether this department, "Lessons for Drivers," was appreciated or not. So occasionally, when crowded with material we have left it out. This protest is welcome because now we feel that this department should be maintained regularly.—Ed.

The Bouncing Bomb.

The elastic properties of rubber are being used by the Germans in their latest missile, the bouncing bomb. This curious device has a base of rubber so weighted that the bomb when thrown through the air strikes upon it. The impact causes it to leap into the air and also releases the time fuse. This fuse is so arranged that the bomb bursts when at the highest point—some six feet from the ground. Its destructive power is then much greater than if it exploded while on the ground.—Milestones.

Do you really enjoy your work, or are you constantly growling about its being the meanest business in the world? It is if you say so—to you, or you can glorify it and make it the finest thing under the blue canopy of heaven. Take your choice!

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Automobile Dealer and Repairer

A Magazine of condensed and compact information for busy readers.

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Member of the Associated Business Papers.

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ADVERTISING RATES MADE KNOWN ON APPLICATION

NEW YORK, APRIL, 1918.

Missing Numbers—Our Readers are requested to remember that it always gives us pleasure to re-send numbers which have gone astray in the mails.

The Automobile Dealer and Repairer in Australia and New Zealand.

Mr. R. Hill, Matlock House, Devonport, Auckland, New Zealand, is our accredited representative in Australia and New Zealand for obtaining new subscriptions.

WHO WILL HELP?

Every subscriber has one or more friends, who would be benefited greatly by reading The Automobile Dealer and Repairer regularly. We want to ask all our readers to make an effort to add one or more names to our subscription list. We are still offering The Automobile Dealer and Repairer to new subscribers only at the special rate of 15 months for $1.00, but this offer is not likely to be held open more than two or three months longer, because on the first of July the new and increased second-class postage rate goes into effect.

We would like, during the next two or three months to add two or three thousand new subscribers to our list, and if our readers will help us just a little, it can be done. Each reader knows how valuable our magazine has been to him, and can conscientiously recommend it to others.

NO TIME TO LOSE.

If you do not wish to pay more for The Automobile Dealer and Repairer than you have been paying, and more for all the other publications you are taking, you should write your Congressman and the two Senators from your State (if you have not already done so) at once, and insist that they vote for the repeal of the unjust and impracticable second-class postage law, passed at the last session of Congress. This law raises rates all the way from 100 to 800 or 900 per cent.

Readers located at places distant from the publishing centers are especially hard hit by this new law, as the rate ultimately to far distant points is to be ten cents a pound, instead of the present rate of one cent a pound. The publication with a subscription rate now of $1.00 a year to all parts of the United States will be obliged to raise the rate to all the Pacific Coast States and States west of the Mississippi River to $2.00 a year, and even then it will be no better off than at the old rate.

The new postage law goes into effect July 1st, so that there is no time to lose. Not only write yourself to your Congressman and Senator. but get as many of your friends as possible to do the same thing. Why should people living at far distant points from New York, for instance, be forced to pay more for their reading matter than people living within a radius of 300 miles? The publishers do not wish to charge any more; they desire to maintain what is called a flat rate; that is, the same subscription price to all parts of the United States.

Congress, however, takes a different view of the matter and insists upon penalizing people who live away from the big publishing centers. It is the most unfair law with respect to postage which has ever been put on the Statute Books. Don't think that your word will not count because you are only one. Every man or woman should feel that it is his duty to write to his Congressman and Senators and enter a strong protest against this unjust law. If enough people will do this, there is a strong likelihood that the bill may be repealed at this session of Congress.

As we have before explained in previous communications on this same subject, if you don't know the name of your Congressman, consult your Postmaster, and the same regarding the Senators. Address the Congressman, "House of Representatives, Washington, D. C.," and the Senators "Senate Chamber, Washington, D. C.," and do it while you are thinking about it or you may overlook it.

HE WAS FROM MISSOURI.

The publishers of a journal like The Automobile Dealer and Repairer come in contact through the mails with people of many minds, serious, aggressive, apologetic, humorous, etc. We often send to a prospective subscriber, in the hope of securing his subscription, seven letters before we decide that his case is hopeless, and abandon him to his fate. It is generally understood that a man from Missouri has to be shown, therefore it is not surprising that it took seven letters to convince Mr. C. O. Graham of Missouri, that he needed The Automobile Dealer and Repairer in his business and daily life. He capitulated after a while and this is the way he did it:

"Motor Vehicle Publishing Co.

"Gentlemen:—

"Your last, most persuasive, and quickly effective letter received recently. It is with a sense of shame that I admit a semi-criminal negligence in lack of response to your oft-repeated attempts to guard me against all accidents per the Auto-Route, also to inform me how to repair my machine and lastly, merely incidentally, to separate me from simeoleon, or in the Missouri vernacular, the iron dollar.

"I must admit that appearances are against me, but the truth of the matter is, I have read your paper, as much as I could, between doctoring one child for tonsilitis and another with pneumonia, milking 'bossy,' feeding the pigs, receiving car loads of feed, and seeds, billing and sacking same the next

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day, and loading for different places of destination, also delivering feed of all kinds to my customers in a town of 3,000 inhabitants, these are only a few of the incidents that have conspired to prevent me taking advantage of numerous offers to help me out of auto troubles. But, now that this is the really last and final call, I arise to the occasion, putting all other and minor considerations in the background, and accept with all my heart."

INTERESTING TESTIMONIALS.

We are receiving constantly, letters from our subscribers, advising us that, if the new postage law goes into effect, we may raise our rates to $1.50 a year. Some of these letters are so particularly strong, and so very interesting that they are well worth reading. Here is what a new subscriber, who received his first magazine in December, says:

"I am a new subscriber, starting with the December number. If the new postal rates go into effect, I fail to see why you should hesitate about increasing the price. Surely, no one who has seen a copy of the Automobile Dealer and Repairer would hesitate to pay $1.50 or more for twelve numbers."

Another subscriber writes the following:

"Regarding your inquiry as to whether subscribers would object to a raise in the price of the Automobile Dealer and Repairer, would say that I will send $1.50 when my subscription expires, just as readily as I would $1.00."

A strong testimonial of value comes from the Nantz Auto Co., of Samson, Ala., who write:

"Your Automobile Dealer and Repairer is a self-cranker, to anyone who has an auto. I have been a reader of it for a long time. When my subscription expires, if you have to charge $1.50 for renewal, it will be cheap for the valuable information you supply. Five dollars wouldn't be any too much for it, for I gain something from it every month."

Here is what an Indianapolis reader writes:

"There is no good reason why your income should be reduced on account of this increase in postage, that you have no control over. I am a railroad man, and whenever wages are increased, the railroad companies always ask for increased freight rates, thereby shifting the burden to the consumer, where it belongs. It has always been the custom that when factories or mines, or in fact, any industries, have to pay large increases in wages or cost of raw material, the price of the finished product is raised accordingly and the consumer pays the bill. You are acting in the capacity of a factory, your product is a magazine, and your subscribers are the consumers. Now if you had a fair income before the war, it is far from adequate now, for everybody knows that wages have increased everywhere and raw materials have soared, so with the increased postal rates it must be imperative that the subscribers stand some of this added expense. I would suggest that the subscription rates be increased accordingly."

These are only four out of the many gratifying letters which we have received and the unanimity with which those who write express willingness to pay the increase, in case an advance should be necessary, is very gratifying.

One way to avoid the raise in rates is for our readers to write to their representatives in Congress and the two senators from their states insisting that the new law be repealed. As we have before pointed out, you can obtain the name of your representative, undoubtedly, from your postmaster, and the representative should be written to, House of Representatives, Washington, D. C. The two senators should be written to, The Senate Chamber, Washington, D. C.

We know that a great many of our readers have complied with our request, and we avail ourselves of this opportunity to thank them for so doing. We hope that all who have not done so will take the matter up and write promptly.

LEND—NOT SPEND—YOUR MONEY.

If you lend your money to the Government, you may be quite sure that it is going to be used for some national purpose—to prosecute the war successfully, to care for, equip, arm, and supply our soldiers in France, to be used by our Navy in ridding the seas of the murderous U-boats.

But if you spend your money, even with the belief that by putting it into the channels of trade others into whose hands it comes will lend it to the Government, you will have done something the patriotism of which may be very questionable.

First, you have withdrawn from the supply of material of the Nation something to replace which in the market will require labor and material which should be devoted to war purposes.

Second, the person to whom you pay your money may also use it to purchase things requiring material and labor which should be devoted to war purposes. And the person to whom he pays it may repeat the operation.

But when you lend your money to the Government instead of spending it, you will at once lessen the drain to a certain extent on our country's resources, its material, its labor, and its transportation facilities, and in addition you supply your Government with money to be used in winning the war.

Every purchase of a Liberty Loan Bond is an individual act toward bringing victory to America and her allies.

UNPATRIOTIC LEGISLATION.

What would seem, on the face of the matter, to be a gross miscarriage of legislation is had in a bill introduced by one of our New York senators in the State legislature, at the request of the State Highway Department. This bill is framed to deny the use of the New York State roads to army motor trucks and other five-ton trucks. The State Highway Department claims that during the last two or three months hundreds of new army trucks have passed on their way to France and that the roads have been badly damaged by this traffic. We should think that a department so well versed in road construction would realize the fact that slow-moving vehicles no matter how heavy do not have the destructive effects upon roads that light automobiles have. Why not prohibit the use of the roads to horses, teams, automobiles and pedestrians; for any sort of traffic is bound to have its effect?

We trust that the governor will veto this bill before it goes into effect should he be asked to sign it. Why should the State of New York or any other State in the union, for that matter, protest because of the slight expense brought about by the use of the roads for army trucks. Does France or England

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or Italy raise a complaint because their roads are being destroyed? We can hardly understand why it is that a few men will choose to consider money above the lives of our boys on the other side. We feel that all of the resources of the State should be turned toward winning the war and that any legislation which hampers the work of the Government in any way should be discouraged heartily.

Should a bill of this sort pass, transportation facilities into or through New York State would be greatly congested, for the motor truck has done more to open traffic than any other factor outside of the railroads in the past six months.

WE WANT TO HEAR FROM THE NO'S AS WELL AS THE AYES.

We keep hearing all the time, we are glad to do so, from our subscribers who are willing to pay an advance of $1.50 or possibly $2.00 per year, if they are obliged to, because of the proposed increase in second-class postage.

Here is what one of our subscribers thinks about The Automobile Dealer and Repairer. He says, "I take several automobile papers, but find yours is always in the lead. I would subscribe for The Automobile Dealer and Repairer if you raised to $3.00 a year as it is well worth the money. I couldn't get along without it."

We want to hear not only from those who are willing to pay the increase, but particularly from those who do not wish to pay the increase, and there must be some of our subscribers who feel that way about it.

Now all you people who object to paying an increase of 50 cents a year to $1.50 and would stop your subscription if this increase is made, please stand up and vote on this question.

Send just a postal card if you do not want to send a letter and tell us what you think about it.

We wish to impress upon our readers that we do not want to raise our rates if we can help it, but we have no control over conditions. It is well known that everything, almost, has increased in price. Why shouldn't the subscription rates of magazines increase a little at least.

Write us at once and then you won't forget about it.

STANDING THIRD ON THE LIST OF INDUSTRIES.

According to Chas. Francis, one of the most prominent printers in New York City and in the whole country, the printing industry ranks third in the United States in importance. Mr. Francis takes into account, in his estimate, the allied industries of printing, such as paper making, binding, lithographing, etc. This would seem to be fair because without printing there would be no necessity for paper or for electrotyping or binding.

And yet, Congress last fall, at the behest of one man, incorporated in the war tax bill a clause which, unless it is repealed or modified greatly, will result in crippling and probably destroying a considerable part of the great printing industry of the country. It would seem as if Congress might be employed in better business than ruining the industries of the country.

Publishers who are driven out of business, as numbers of them will be by the second-class zone postage law, cannot help pay war taxes. An industry that is destroyed cannot assist in winning the war.

Our readers, of course, are already familiar with the conditions of the new second-class rate which will go into effect July 1st, and those of them who have not already sent their protests to their representatives in Washington and to their senators, we hope will do so at once.

DISCONTINUANCE OF TECHNICAL SCHOOL.

With a great deal of sorrow we announce the closing of the Technical School which for the past 38 years has been located in this city. This school was started in 1880 by the carriage builders' interests for the purpose of training young men in mechanical drawing as well as instructing them in the theory of carriage building. Two years ago the carriage builder interests decided that the school should be maintained by the automobile manufacturers, and the suggestion was favorably received by the automobile interests, as well as the Automobile Chamber of Commerce of New York. For some reason or other the automobile interests have ceased to contribute toward this worthy enterprise, and though the rooms, heat and light are furnished by the Mechanics Institute, the manufacturers did not care to put any more money into the Technical School treasury.

Many of the young men who have been trained in this school occupy big positions in various automobile body and automobile manufacturing plants, and we do not doubt but that the discontinuance of this school will shortly result in a lack of trained body designers.

TROUBLE-DEPARTMENT



This department is intended as a "trouble clearing house" for car owners, dealers and repairmen. Inquiries in relation to marine motors will likewise be answered as they are of interest to car owners and others who use the two-stroke cycle engine.

Readers are requested to make criticism and comments or to freely discuss any subject of interest to the automobile industry, and to add information of their own experience in remedying troubles.

Inquirers are asked to give the fullest information in every case so that replies may be made intelligently, and thus be of interest not only to the inquirer but to others.

2400 Alternating and Direct Current.

From E. Teska, Wisconsin.—How can I find out the difference between a direct-current generator and alternating current which I am using for lighting my garage? It is rated at 115 volts, 9 kilo., and I would like to use it for charging storage batteries.

Reply.—If you will look at the armature, or the revolving member, you will see on one end a device called the commutator, the device through which the current from the armature windings passes to the collecting brushes. If the machine is a direct-current generator, the commutator will be composed of a number of segments, insulated from each other, and extending lengthwise or in a line with

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the armature shaft. If the machine is an alternating-current generator, the collecting arrangement will be in the shape of a number of rings, around the shaft.

2401 **Carburetor Trouble.**

From S. P. Leonard, North Carolina.—I have a 1914 model Ford car and have been having trouble with the carburetor, of late. In the first place it is hard to start on the magneto; batteries do not help any, and after it is started, it will miss at times. I have tried all kinds of adjustments and get no better results. I have overhauled the motor completely recently, and installed new valves with oversize stems and new piston rings, but it did not help my trouble any. The ignition system is in good condition. I installed a pet cock in the intake manifold and when I open this the motor runs perfectly without a miss, and pulls like a young mule, but opening the pet cock does not help the starting in any way. The carburetor in question is a new Holley, put on about three months ago. The motor acted the same before I put on the new carburetor. Why does a motor pump oil after the engine is cleaned and the valves ground? This engine did not pump oil before I did the work on it, and since, the third cylinder has been pumping oil, I have taken the head off and examined the valves thinking that the valves of that cylinder were held off their seat through some cause or other, but could not find anything the matter with them. The piston is a good fit in the cylinder and I have put in new rings and beveled the upper edge of the bottom ring, but it still pumps oil when the motor is firing on all cylinders.

Reply.—In answer to your letter relative to trouble with the 1914 Ford car, undoubtedly all of your trouble is caused by the present low grade of gasoline. This subject is discussed in an article which appeared on page 73 of the March Automobile Dealer and Repairer.

For starting your car you might try the application of heat to the manifold. There are a great number of electrical devices on the market for accomplishing this, though the writer has used a hot flat iron, hot bag of sand, an electric flat unit and boiling water.

Your idea of opening the pet cock in the manifold is good and you will find that one of our readers questioned us regarding its installation in our March number. The pumping of oil is also discussed on Page 73 of the March number. In fact, this article entitled "Difficulties Encountered in the Use of Present Day Gasoline and Heavy Fuels" is a direct answer to your letter.

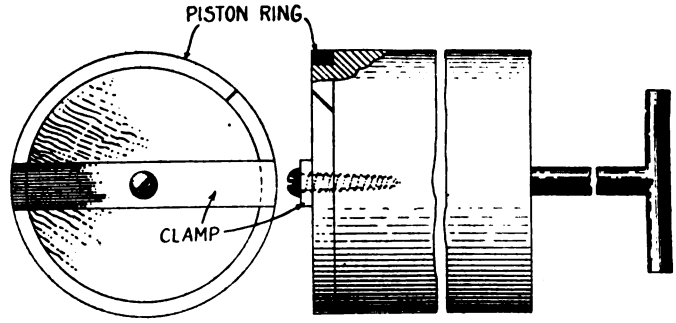
2402 **Oil Leakage.**

From E. C. Wisser, West Virginia.—My Dodge has been leaking oil past the cylinder rings. I have decided to put two new rings in each cylinder. Will you kindly give me some idea about the job?

Reply.—We would advise you to install a set of leak-proof rings rather than the plain butt-jointed rings, but before doing this be very sure that the cylinders are round and that there are no scores or scratches in them. Should you finally decide to fit the plain butt-jointed rings in the cylinders the following directions should be followed very carefully.

First, see that the rings fit the piston ring grooves without binding on the sides. Be sure that the grooves are thoroughly cleaned before trying to fit the rings, and should the rings be too wide, work them down with fine sand paper on a flat board. When the rings have been fitted to the grooves prepare a "dummy" piston from a block of wood with a good clamp at the top, as shown in our sketch. Place the ring to be fitted in this clamp and slide the ring into the cylinder.

You may find that the ring is too large to go into the cylinder, and if so, file down the ends so that it can be slipped in leaving about .001 of an inch between the ends. Coat the inside of the cylinder with Prussian blue and slide the ring up and down



"Dummy" Piston for Fitting Piston Rings Into Cylinders.

once or twice in the cylinder. When the ring is removed you will find that the blue has been scraped on at a number of points indicating high places. Scrape these places off with fine emery cloth and repeat the operation until the ring contacts its full circumference of the cylinder. Then snap the ring on to the piston and fit the next ring. After you have fitted a ring to a cylinder, be sure to use that particular ring in that cylinder. Do not transpose it to another cylinder.

2403 **Top Refinishing Liquid.**

From S. Elferman, Iowa.—Can you tell me of any liquid that I can use on the top of my 1915 Dodge Bros. car, which is fitted with a cravanetted top, that will refinish and darken it, as well as make it water proof?

Reply.—Editorial policy will not permit us to recommend any particular product and we would suggest that you consult the nearest dealer in automobile accessories, or possibly your Dodge agent may be able to give you just what you are looking for.

2404 **Speed as Related to Power.**

From C. F. Bayley, Vermont.—I would like your opinion on the following question. I have a 1916 Metz friction drive car and it suits me nicely, except it is a little slow on hills. On the level, however, it runs fast enough. At present it has 32-inch wheels fitted with full-studded Woodworth treads, making them 33 inches in diameter. How much faster could I take hills on a 30-inch wheel, than I do with the 32-inch outfit. My car has run 3,000 miles and I have never seen the inner tubes. Woodworth treads are all right.

Reply.—The question of speed comes down entirely to engine power. The substitution of 30-inch wheels for the present 32-inch wheel equipment might result in a slight increase of pulling power, but possibly a decrease in actual speed. To increase the speed of the car above a certain limit you would need a larger engine. If you are looking for more

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speed and find that you can surmount hills on high at present with a little difficulty you may equip the car with larger diameter wheels. This would mean that hills which you surmount on the 32-inch wheels you might not be able to surmount on the larger sizes. Smaller wheel equipment as you suggest would mean that you could get up safely hills on high but on level going with an engine running at highest speed the car speed would be cut down. The rule which you can follow in all of these cases is that increased speed means less power and decreased speed means more power, the engine equipment being the same.

2405 **Eight Short Questions.**

From David H. Cressman, Pennsylvania.—Will you kindly answer the following questions at your convenience: 1—I have a 1917 sensible six Oakland auto. Would it be advantageous to instal a small tank to carry gasoline for starting and then carry half and half gas and coal oil to run the car with? Would there be any ill effects to engine and would it be saving enough to pay to make the change? 2—In installing a spotlight where is the place to connect it? 3—Can you give me a pointer to take out a dent in gas tank in rear? 4—If storage battery is testing about 1200 will it become stronger again if car is run and the lights not used? 5—What are causes for storage batteries running down in short time and what is the reason of the water working out on the top? 6—I have a 1915 Ford with G. & D. starter and Willard battery. Do they recommend a special make battery for this starter? 7—Will battery charge and become stronger if car is run and the lights not used? The whole light system, front, side, rear and dash lights are connected together, also horn. I am told the storage battery is only for starting the engine, and so that I can have lights when the engine is not running. Is this so? Will a 31 by 3½-inch tube fit a 32 by 4-inch casing?

Reply.—It is hard to say just whether your engine will run on a mixture of half gasoline and half oil. We doubt very much if you will be able to use this mixture for two reasons. You will be unable to heat the mixture hot enough to get the maximum power, and providing the engine runs, you will be constantly troubled by the formation of carbon in the cylinders. If you can obtain a combination manifold for this engine and buy a water vapor attachment, you may be able to use the half and half mixture. Before installing such a tank we should advise you to make a number of experiments.

Your spot light may be connected in either of two ways. You may connect both terminals of the spot light to the two storage battery connections or you may ground one terminal of the spot light and connect the other wire with the wire which leads from the current indicator to the back of the switchboard. For taking out the dent in the gas tank you may solder a brass rod to the deepest portion of the dent and work the dent out by pulling on the rod.

Under ordinary conditions the storage battery may be charged if the car is run and the lights not used, being careful not to draw on the storage battery for starting current. If your battery now tests about 1200, we would advise you to take it to a storage battery expert, for there is evidently some trouble with the battery itself. If the water works out on the top of the battery very much it is probably an indication that the battery is too full of water, and is sure to be one of the reasons why it discharges so quickly. You had better see a storage battery expert about this and he will give you full directions. Practically any of the popular makes of storage batteries will work well with the Gray & Davis-Ford starting and lighting system.

The Gray & Davis system is intended to furnish all the lighting current and current for the starting system. There should be no difference in the steadiness of the lighter whether the engine is running or not, and if the lights flicker or do not burn steadily, there may be trouble with the connections or with the current regulator. Without further details we cannot answer this more completely.

It will not be wise to use a 31 by 3½-inch tube in a 32 by 4 casing, for the tube will be stretched too greatly. By doing this the tube mileage will be cut probably more than 50%.

2406 **Ford Headlights.**

From S. H. Puffenberger, Maryland.—As a reader of your paper I desire a little information and advice from you.

I have a 1914 Ford that had originally an acetylene lamp equipment. About two years ago, I installed electric lights, wiring them in series as on the later Ford cars, and using six-volt, 12-candle power light bulbs. The lights were as satisfactory as installed generally on Fords, but did not give good illumination when the engine was running at low speeds. Some people obtain better results by wiring the lights in parallel or multiple and so I tried this scheme, but as soon as the light switch is put "ON," the engine misses fire and operates poorly, sometimes stopping altogether. What would you suggest as the trouble? Do you think that there is a leakage of current at any point, or is this old style magneto insufficient for ignition and lighting purposes?

Reply.—The early Ford magneto for those machines built up to the year 1915 was designed primarily for ignition purposes only and did not give sufficient current for lighting. Due to the ever increasing demand for electric lights the Ford Motor Company finally put lights on as regular equipment, realizing all the time that they would never give complete satisfaction because of the lack of current. At first the magneto would work fairly well, but as time went on the strength gradually decreased until the lights would not give much illumination.

As long as the two lights are wired in series their combined resistance prevents the passage of too much current through them and so the ignition system operates. As soon as the lights are arranged in parallel, the total resistance is cut in half and naturally the ignition system does not receive enough current to operate it.

We doubt if your magneto will ever give satisfaction when used both as an ignition source and as a source of current for lights, and we would advise you to install a storage battery or an auxiliary lighting system.

2407 **Charging Storage Batteries.**

From T.H. Parker, California.—I have constructed a rectifier for charging storage batteries as directed

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in the Automobile Dealer and Repairer though I do not know yet how it works. I note that the directions advise the placing of the plates an inch or more apart; would it not be better to place the plates nearer together than an inch?

I have an electric generator with shunt wound fields, controlled by a field rheostat. The voltage ranges from zero to 150 and the amperage output is nine. I would like to charge one or more storage batteries from it. How could I control the current by this field rheostate or should I use a rheostat in the line? The storage battery indicates a charging rate of a certain number of amperes, but nothing is said of the voltage. Would 110 volts damage the battery?

Reply.—We would not advise you to put the plates any nearer together than Mr. Leurs recommends, for if we are not mistaken a certain amount of internal resistance is necessary in order for the rectifier to work properly.

Your second question relative to the shunt wound generator, which you have, is not quite clear. If you can control the amperage in any way through a regulator device on the machine itself, you will not need a special rheostat in the main line. The voltage of a line makes absolutely no difference in charging your storage batteries. The amperage is the controlling factor and we would advise you to connect storage batteries in series for charging, utilizing the full voltage not to exceed 110 and controlling the amperage by suitable rheostat or like resistance in the charging line.

2408 **Camshaft End Play.**

From H. D. Brice, Illinois.—I have just taken down a four-cylinder Continental engine, Model N, which was used on a Moon, Model 4-38 car. Late last season a peculiar noise developed which seemed to be in the timing gears. I found everything apparently all right upon inspection, with no visible signs of wear. The camshaft has a hardened button with a spring in back of it, on the end, and this button bears against the timing gear case cover. I think that this spring may have weakened, or else the button sticks. What do you think?

Reply.—If the cam shaft in this engine has a tendency to move backwards or forwards, or has what is termed "end play" the trouble is probably due to the fact that the spring beneath the hardened steel button at the end of the shaft has been weakened or assumed a permanent set position.

We would suggest that you remove the button and put in a new spring and button, which should remedy the trouble.

Practically the only thing that retains the cam shaft in position is this steel button and hard bearing surface on the timing gear cover. You might make a careful examination of the camshaft bearings and be sure that they fit the shaft tightly, for should they be too loose they will have the tendency to increase the end play.

2409 **Timing of Velie.**

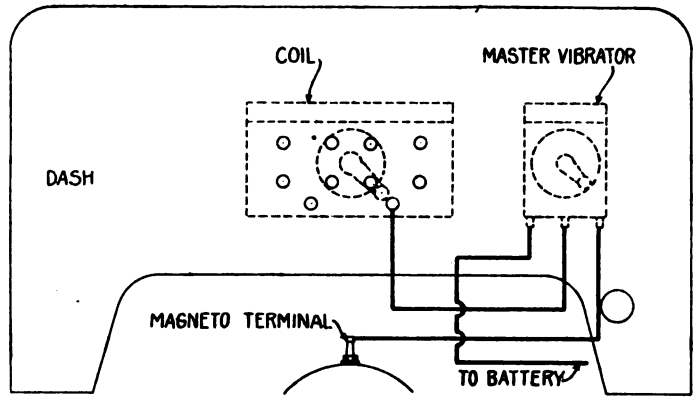
From Edward Nuetzel, Illinois.—Will you please let me know how to time the spark mechanism on a Velie 1916 Model 22, equipped with a Continental engine 7W and Remy Battery ignition system? What I would like to know is the position of piston number one, when the circuit breaker points begin to separate?

Reply.—This machine is fitted with automatic spark advance mechanism. When the piston in No. 1 cylinder is at dead top center of the firing stroke the breaker points should begin to separate. The advance will be taken care of in the advance mechanism.

2410 **Noisy Transmission.**

From Fred Kegel, Ohio.—I have a 1916 Ford which, when running at 20 or more miles per hour makes a humming noise which seems to come from the transmission. The noise has developed within the last 200 miles. Can you tell me what causes this? Does a Ford need oversize piston rings after running 9,000 miles? Do patent piston rings need fitting like the ordinary rings? Would you advise using a master vibrator on a Ford? Is there a way of wiring a master vibrator so that the electric head lights can be used?

Reply.—The humming noise which seems to come from the transmission of your Ford car is probably located in the rear axle and carried along through the drive shaft to the transmission. The indications are that the master and beveled driving gear do not mesh properly. This whole matter is taken up in the March issue of the Automobile Dealer and Repairer in an article by Mr. Luers.



Wiring of Master Vibrator When Used With Head Light Circuit.

There is no way of telling just when the engine needs over-size piston rings. It depends upon the engine and the usage which it has received. Only an expert mechanic on metal can give you proper advice.

We would not advise the installation of a new set unless you obtained proper advice from a machinist who has seen the cylinders.

We give herewith wiring diagram of a Ford car with master vibrator equipment.

The so-called patent piston rings must be fitted into piston grooves and will fit the cylinders if the cylinders are absolutely round. This is the only fitting required.

2411 **A Question of Candle Power.**

From Emil R. Miller, South Dakota.—I will be greatly obliged to you if you will answer the following questions by mail. What is the difference between a nine volt 15 c. p. and a nine volt 25 c. p. bulb? Which will give the most light on a Ford magneto? Which uses the most electricity if there is any difference? Can I purchase a ready made

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rectifier for storing a battery from a Ford magneto, such as mentioned on page 39 of the January Dealer and Repairer? Where can I get a pure aluminum plate? How should the electrolyte be mixed?

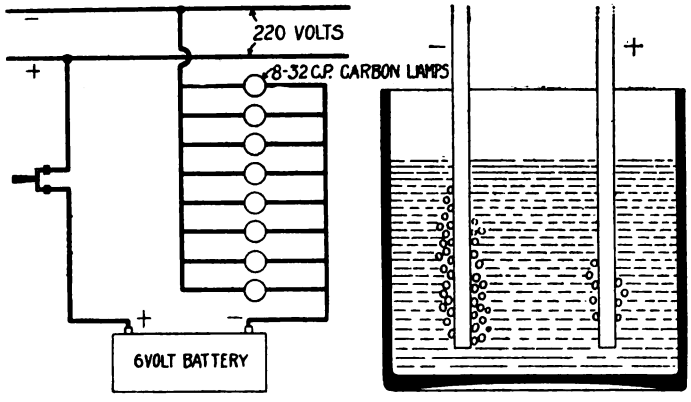
Reply.—The difference between a nine volt 15 c. p. and a nine volt 25 c. p. is that the larger light takes the most current. A 25 c. p. light consumes slightly more than 50% more current than a 15 c. p. Of course a 25 c. p. bulb will give the most light on a Ford magneto at high engine speed. When the engine is running below normal there will be little difference in the amount of light.

We do not know of any manufacturers making a rectifier for storing a battery from a Ford magneto. You should be able to buy pure aluminum plates from a brass foundry or from some wholesale mechanical supply house. The electrolyte solution should be obtained from a druggist if you intend to use the neutral ammonium phosphate. If you intend to use sodium bicarbonate solution, however, you can mix it yourself. Dissolve as much cooking soda, which is the commercial name for sodium bicarbonate, in water as the water will absorb. Let it stand over night and strain it through a cloth.

2412 **Charging Storage Battery.**

From Frank J. Nagel, Minnesota.—Will you kindly answer the following questions by letter?

1—Give wiring diagram for charging Willard storage battery, 6 volt, 80 ampere hours on a 220 volt, direct current circuit. 2—Why does a 32 c. p. carbon filament, 110 volt, use 1 ampere and a 32 c. p. 220 volt only ½ ampere? 3—Which consumes the more current, charging a battery with 8 32 c. p. 220 volt lamps, or 1 32 c. p. carton filament lamp burning direct, say for six hours? Give example. 4—How can I find the positive of the line wires? 5—Which wire should lead through the lamps, positive or negative? 6—How can



Charging a Six Volt Battery and Illustrating Method for Finding Polarity of Lead Wires.

you vary the amperage while charging this 6 volt 80 hour ampere battery? 7—Is this battery charged at 220 volt rate? 8—Will battery run down if allowed to connect to the line after power plant shuts down? 9—How can you tell the difference between a sulphated or short circuited cell? 10—What harm is done by taking electrolyte from one cell and putting into another?

Reply.—We are enclosing herewith a wiring diagram for charging a six volt storage battery of 80 ampere hour capacity from a 220 volt current line.

You will notice that the positive wire of the line is connected from a switch with the positive battery terminal; the negative battery terminal being connected with one side of a bank of 8 32 c. p. 220 volt lamps. The other side of this bank is connected with the negative line wire. It makes little or no difference which line leads through the bank of lights, but as a general rule the bank is connected with the negative side of the circuit. The eight lamps will allow four amperes of current to pass into the battery. This amount of current you will note, is the finishing rate marked on the battery and is the rate to use. The positive and negative line wires may be found by dipping them in a solution of salt and water. If they are held about half an inch apart you will notice a great number of bubbles rising from one of the wires. This is negative. The positive wire will have very few bubbles in comparison. If during the charging all of the lights go out indicating a secession of the charging current, the switch should be opened immediately, or the battery will be apt to discharge through the line.

A 32 c. p. carbon filament lamp consumes slightly more than 100 watts and since a watt is the product of the voltage times the amperage, a 32 c. p. lamp burns about one ampere of current at 110 volts. By the same rule a 32 c. p. 220 volt lamp only consumes about half an ampere. Electrical current is usually measured by watts so that you can see that approximately 110 watts are consumed in the different instances, bringing the cost to approximately the same figure for the same c. p. lights on the two currents.

Eight 32 c. p. 220 volt lamps when used in charging the storage battery use up about 880 watts, while one 32 c. p. light of the same voltage only burns one-eighth as much current. If it should take eight hours to charge your battery, using the eight lamps as resistance, you would consume considerably more than eight times as much current as you would simply by burning one light, because you would be using up approximately four amperes or 880 watts for charging the storage battery.

We doubt if you will find it economical to use this voltage for charging one battery, for you will be obliged to put in so many lamps that you will waste considerable current in the lamps themselves. The amperage passing through the battery may be varied by the addition or the removal of lamps. With the addition or removal of each lamp you add or remove half of an ampere. A cell sulphated naturally by normal current use, usually remains in good condition for a long time, while one which is sulphated by short circuit depreciates very rapidly. Practically the only way that you can find out whether a cell has been short-circuited or not is to remove the cover and examine the plates. If they are badly warped or the active material has been separated from the grids, it is an indication of over-usage or short-circuit.

Electrolyte should not be transferred from one cell to another for the very reason that the specific gravity of all the cells should always be kept alike and the electrolyte level in all the cells should always be approximately the same. Should you remove the electrolyte from one cell and put in another, the level in the first cell is lowered slightly, and to bring it back you would probably add distilled water. This of course will dilute the electrolyte and the specific gravity will be lowered.

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3 **A Tractor Question.**

'rom F. J. Hund, Kansas.—I am thinking of inting a 20 h. p. auto engine on a light tractor ne geared from 2 to 3 miles per hour. Will it i the engine to put it at hard work like plowing? v many gallons of water should the radiator hold keep from over-heating? Will that size engine two 12-inch plows? Would I be going against law to put an auto engine on a tractor frame buy it? I know this is not in the auto line but information you can give me on this subject be appreciated. Also if I am not asking too ch would you advise to buy a used car if engine good compression and pulls good? Would you ise me to put a 1918 body on a 1909 car?

eply.—We see no reason why you cannot use a h. p. automobile engine in a light tractor frame red from two to three miles per hour, for many he light tractors now in use are fitted with en- es very similar to those used on automobiles. i may be able to use the present radiator by ing an auxiliary tank at the side which should d about as much water as the present radiator ds, giving a capacity of about double that used automobile work. The engine should easily pull 12-inch plows.

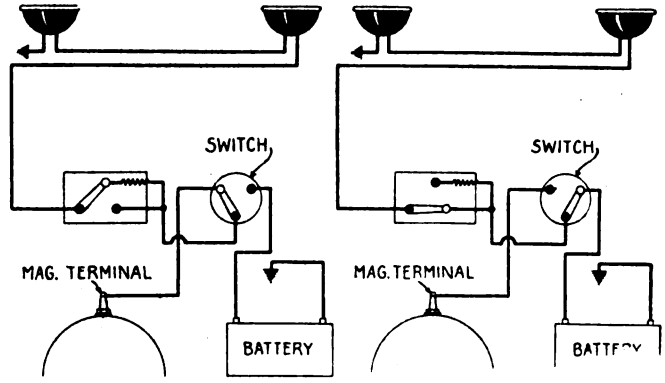
As you did not say what engine you intend to use, cannot say definitely that you would not be ng against the law. If the engine is one of the ular makes, we doubt if the manufacturers care the least whether you use the engine for auto- bile work, for marine work, or for tractor work. Your last question is very difficult to answer. e amount of compression in an engine is only one he general indications of efficiency. The engine ght be worn out in every other particular but e a new set of rings and a new cylinder plug. e rest of the car might be in poor condition. The nsmission might be fully gone and the rear axle irely worn out. The writer has often seen en- s which had very poor compression temporarily aired by the addition of graphite to the cylinders. h this repair the engine would run sometimes a week, without showing any loss of compres- n.

We would not advise you to put a 1918 body on a 9 car, for we feel that it would be cheaper for to buy a used car of more recent date.

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4 **Wiring Ford Car.**

'rom R. G. Kimball, New Hampshire.—I have a d with Atwater Kent ignition. I run head and lights on magneto. I would like to hook up my nts on batteries also, to enable me to have lights en car is standing. Would you advise sidelights two bulk tail lights and how would you wire same and what candle power bulbs would you use enable a small amount of current to be used from teries. Would it be possible to insert small bulbs neadlights and have a good looking job. I believe eflector has been made for this purpose. Could give me information as to where to obtain it? With my Atwater Kent system I am usually able shoot a spark into one cylinder with the snap ton on coil. After my engine is warmed up I usually start my engine in this way by allow- a charge of gas to be sucked in upon stopping. have thought that by the aid of a primer I ght have success in starting my engine with a snap spark after it has been standing some time. The fact that the gas injected by a primer would not reach the cylinder that was on firing owing to the fact that the corresponding intake valve would be closed I am at a standstill to know whether or



Wiring Ford Headlights for Dimming. At Left, Dim From Magneto; At Right, Full on From Battery.

not it would be advisable for me to put in four pet cocks in cylinder head and connect a primer to these.

The difficulty would be, how could I install same and be enabled to open and close pet cock and inject gas from the seat. Could you give me the desired information if you think the scheme advisable and worth while?

Don't think that I am too lazy to crank my car. I simply have a hobby of trying to see what can be done by exerting a little effort.

Reply.—We would advise you to use headlight bulbs of about 15 c. p. and rather than install two sets of bulbs, one for greater illumination and the other for lighting the car while standing, we would advise you to put in some sort of a resistance coil, as shown in the diagram, or possibly wire the lights so that they can be run in series while the car is standing, and parallel at other times.

We do not know of any reflector which you can obtain for a Ford car light, that has provision made for two bulbs. We would not advise you to install a primer such as you suggest for starting the engine by the snap switch method, for you could never be sure of results. The pressure required would be in the neighborhood of fifty pounds and even if you were able to install a pet cock arrangement in the cylinders, you would always be troubled by pump leakage and other items of this sort. Such an installation would cost you about two dollars for the pet cocks, about one dollar for the tubing, and from three to five dollars for a suitable priming pump. For this figure you should be able to obtain a mechanical starting device or possibly a second-hand electrical starting motor.

2415 **Buick Timing.**

From Wm. F. McMaster, New Hampshire.—I have a neighbor who bought a Buick 40, a good second hand car. The trouble with it is the valves are not set right. He had me look at it and I find it firing 4-2-1-3. On the fly wheel is a mark D. C. 1 and 4 one inch and a quarter; to the left of that mark from the way the fly wheel turns is another mark and the same distance from this mark is a third. Now, I took off the front gear plate, turned the fly wheel until the first mark by D. C. 1—4 was centered on the crank case, disconnected the gear

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and turned the cam shaft until the exhaust valve closed of No. 4 and this does not seem to give results. Would you please give me the instructions—where I might get these valves right. I would also like a little information about my car which is an old one. All the bearings are roller and I find that the raceway that holds the bearing called the pinion shaft is worn quite badly so much so that there must be a crowding off effect on the pinion as I have broken two pinions this past summer and when I break one it means a new shaft as well. My car is an R. C. H.

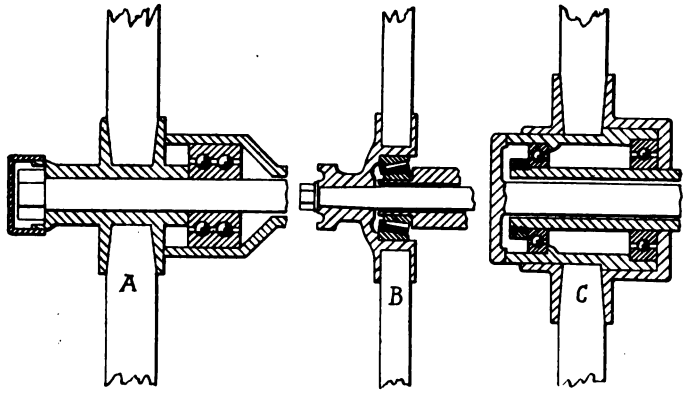
Reply.—The exhaust valve on this car should close before the piston has reached the top center. Turn the crankshaft over until the fly wheel mark D. C. 1—4 is underneath the indicator, then turn it backward for about one and one-quarter inches. The mark on the fly wheel which is before the mark D. C. 1—4, should now be beneath the marker.

At this point, the exhaust valve in either cylinder one or four should close. Turn the camshaft until the exhaust valve in either one or four cylinder just closes, and mesh the gears.

In your R. C. H. car we should advise you to buy a new sleeve for the pinion shaft roller bearing This you may obtain from any of the following concerns: R. C. H. Corporation, Detroit, Mich.; Puritan Machine Co., Detroit, Mich.; Auto Gear & Tire Co., Chicago, Ill.; Pacific Motor Car Exchange Co., 221 West 53d St., New York City, N. Y.

2416 **Types of Axles.**

From Philip Harrington, Rhode Island.—Will you please tell me the difference between semi, three-quarter, and full floating axles?



Three Types of Axles. A, Semi-Floating; B, Three-Quarter Floating; C, Full Floating.

Reply.—At A is illustrated a semi-floating axle. In this type, all of the weight of the car rests on the axle, to which the wheel is applied. The bearing in the housing carries the weight. At B is illustrated a ¾ floating axle. In this case, practically all of the car weight rests upon the wheel itself, and the axle carries but little. In the full floating type, shown at C, all of the car weight is carried on the bearings and housing and none on the axle; the axle therefore floats, and is utilized simply for transmitting the power to the wheel.

2417 **Cleaning a Water Tank.**

From Ernest L. Silver, New Hampshire.—I have in disuse a galvanized iron tank formerly used for heating water. There is doubtless some rust and scale inside. Could it be used for storage of gasoline without danger of rendering the gasoline unfit for use in an automobile?

Reply.—There is no reason why you should not use the galvanized iron tank, formerly used for heating water, for gasoline storage—provided you give it a good cleaning with, possibly, hot water and applications of kerosene oil, the latter especially. It would be a good idea to strain all of the gasoline coming from the tank for the first few months at least.

2418 **Light Bulbs Burn Out.**

From H. V. Kern, Minnesota.—I have had quite a little trouble by the blowing out of the light bulbs on my car and would like to know what causes this. They always flicker and on low or second they blow out every time.

Reply.—From your letter, it would seem that your car might be a Ford, and if it is, the trouble can only be remedied by the installation of two higher voltage bulbs. When the engine is running at ordinary speed the magneto generates from fourteen to eighteen volts, but as it speeds up the voltage increases, and you can plainly see that if the car is fitted with two front lights of nine volts each, they will burn out under higher voltages. When you put in the low speed to keep the car going, you run the engine faster than normal, and so the voltage increases.

Perhaps the magneto of your car generates slightly more than the average current, but in any event higher voltage bulbs will prevent them from being burned out.

If your car is not a Ford, let us know, and we will advise you further. If it is fitted with a storage battery you should not have the trouble that you do. In case the car is fitted with a generator and a storage battery for lighting, you might have a repairman examine the generator cut-out, for this is probably where your trouble lies.

2419 **Timing Remy Unit.**

From Orvis J. Haven, Massachusetts.—I have an Oakland Six Cylinder Model 32, equipped with the Remy electrical outfit No. 166. I have taken the generator off for repairs and do not see any way to put it back and have the engine fire correctly. There do not seem to be any gears marked, and I do not believe they could be put in even if there were, as one can't see when they go together. Does the timer or distributor have to be loosened up and turned around to get the right time after the gears are put in mesh? If you could send me some sketch so as to help me, I would be very glad.

Reply.—The Remy generator should first be placed upon the car in its correct manner and the gears meshed. It should be carefully bolted down and tightened into place, etc. After this has been done, turn the engine over with the hand crank until the piston in No. 1 cylinder is about one-quarter inch from the top of its compression stroke. Connect the spark lever mechanism to the distributor and advance the spark as far as possible. Remove the distributor cover and lift off the distributor brush. This will expose the breaker box cam, which is retained by a small nut. Unscrew the nut and pull the cam from the shaft. This last operation is rather difficult without proper tools, but you may be able to borrow a cam puller from a nearby

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garage. When the cam has loosened turn it with your fingers in its direction of normal rotation until the breaker points begin to separate. Clamp the cam down with the adjusting nut, replace the distributor brush and note whether the brush comes directly under the wire leading to No. 1 cylinder in the distributor box. If it does not, you will be obliged to remove the brush and cam as before and turn it until the points again begin to separate and the brush is directly beneath No. 1 distributor terminal.

When its correct setting has been found, you may put the cam into place and tighten the nut. Verify the setting by trying out one or two of the other cylinders. With the spark fully advanced the breaker points should separate about one-quarter inch before the piston has reached top center of the compression stroke.

2420 Relining Maxwell Clutch.

From Robert C. Grote, Ohio.—I have a 1917 Maxwell car and would like to know the easiest way to renew the clutch lining. The differential makes a loud grinding noise when it is run in high gear between speeds of 25 and 28 miles per hour. At speeds above 28 and below 25, however, it does not bother at all. How can I correct this? The car is equipped with a Simms Huff single unit starter and generator. How can I increase the charging rate?

Reply.—To reline the clutch in your 1917 Maxwell car, you will first be obliged to disconnect the universal joint at the rear of the transmission. Then after having removed all of the control rods, levers, etc., from the transmission, disconnect the transmission housing from the bell housing on the engine, and draw the gearset backward and away from the engine. With the gearset out of the way, the clutch will be exposed and you will find that there are three nuts retaining the clutch springs. Remove these three nuts, take off the three clutch springs, and the cone can be taken from the fly-wheel. A new clutch fabric may be obtained from the Maxwell agent or factory, together with new rivets. In replacing rivets be sure that the heads are driven below the surface of the fabric or you will have trouble.

The differential trouble is probably caused by a wrong adjustment in the gears, and there is no way in which you can remedy this, for it is essential that in this particular outfit the adjustment be made by one who is fully experienced. You will probably be obliged to have a new collar put on in back of the pinion gear.

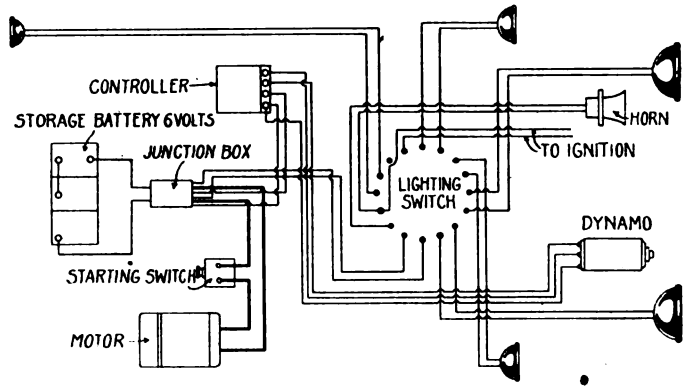
The makers of the Simms-Huff systems do not recommend the changing of the charging current, for they claim that if the generator is changed in any way they will not be responsible for the equipment after the change has been made. Although the writer has had considerable experience in electrical installations, he has never changed the charging rate of the Simms-Huff or Remy machines, preferring rather to take the matter up with the manufacturers or the agents, for in that way only can one be sure of satisfaction.

2421 Henderson Wiring Diagram.

From J. Edward Paterson, Illinois.—Will you kindly forward me the wiring diagram of the Ward-Leonard Starting and Lighting System used on the 1914 Henderson car?

Reply.—We give herewith wiring diagram covering the Henderson 1914 car which was fitted with a Ward-Leonard starting and lighting system, and trust that it is the diagram which you require.

Many of the older cars have been fitted with lighter type switches or other units which make



Wiring Diagram of Henderson Car.

slight changes in the wiring and should you find that this wiring diagram does not fit your car, you might send us a sketch of the various units together with the location of the binding post and all markings, and from this data we may be able to supply you with further information.

2422 Uneven Engine Operation.

From J. W. Scott, Michigan.—Can you give me some suggestions as to the possible trouble with my engine, and how the trouble may be remedied? Number four cylinder in my Model 83 (1916) Overland became scored last winter, through failure of lubrication, I had this cylinder rebored and an oversized piston installed. The shop which did this work makes a specialty of reboring, and is considered very reliable. They assured me that the scoring was not bad and that not over ten-thousandths of an inch was cut away. They claim that they are doing this right along without any trouble and, in fact, showed me an engine on their floor which they had bored one-sixteenth of an inch larger.

After this repair, I put the car up for the winter. A few days ago I turned it over to the service station to have the engine tuned up. They removed the carbon, reseated the valves, and in fact went over the valves in cylinder four a number of times, but cannot get this cylinder to perform properly. They went over the timing and installed a new carburetor temporarily, but could not seem to remedy the trouble. They advanced the theory that with one cylinder larger than the rest, it would require more gas, take a different mixture or something of that kind. What do you think?

Reply.—Although there may be some truth in what the experts say regarding the additional amount of fuel required for number four cylinder, the difference in mixture, etc., we doubt if this is the whole reason for your trouble.

However, assuming that the amount of metal removed was .001 of an inch on each side, the total amount of gas required for a four-inch stroke would be less than half of a cubic inch. We doubt very much if every engine on the market today is so carefully designed that the cylinders do not vary more than one-half of the cubic inch. We should advise you to obtain a compression gauge and com-

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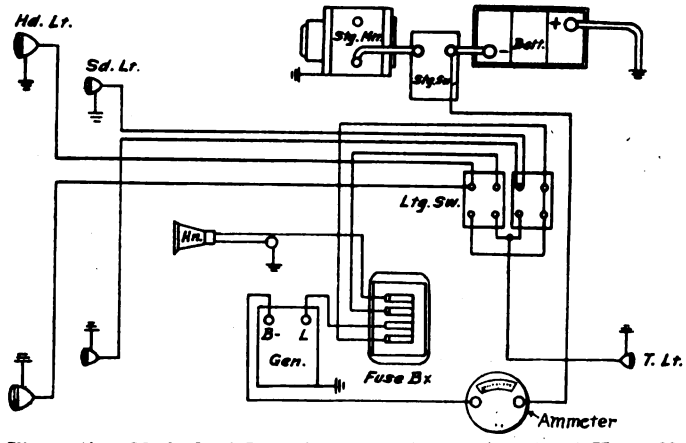
pare the pounds compression in each of the cylinders with that in number four. An unbalanced compression will do more toward uneven operation than any other factor. By installing the new rings in a rebored cylinder you probably increased the compression some few pounds, and we would not be surprised to hear that you had an engine that was knocking. We wish that you would let us know just what you find about the compression, and also tell us whether or not the pistons were changed. By chance you might have put in another piston which increased or reduced the cylinder volume slightly, just enough to unbalance the whole machine.

There is one more experiment that we would like to hear about, and that is the valve lift. Compare the measurements between the top of the tappet and the tappet guide when it is in its highest and lowest positions. Tabulate all of the measurements for all of the valves and let us know the results. Also be sure that the valve clearance between the tappet and the valve stem is approximately the same in all cylinders.

If you will give us the above data, we will be glad to advise you further, for the trouble is such that we do not like to give an answer based only upon your letter.

2423 **Ammeter for Hupp 32.**

From H. & L. Garage, Illinois.—Will you please supply a wiring diagram showing how to insert an ammeter in the circuit of a Hupp 32. This car has no ammeter to show charge or discharge.



Illustrating Method of Inserting Ammeter in Circuit of Hupp 32.

Reply.—The accompanying illustration shows the wiring plan of the car referred to and the place for inserting the ammeter in the circuit.

2424 **Knock in Muffler.**

From Thomas Bryant, New York.—No. 1. I have a Republic truck which has been run about 1,000 miles. Of late I have noticed a peculiar knock which appears to come from the muffler. I feel the knock mostly by laying my hand on the muffler. I notice it most in starting the car when it is cold. Could you please help me in solving the trouble?

No. 2. My friend has a 1917 Overland which gives him much trouble when shifting. He is seldom able to shift or put the gears in first or reverse without first going ahead a few feet in second speed. Why is it that the shifting lever cannot be put in either speed at the position when the car has been standing, without such difficulty? The gears seem to be all right. The car has been run about 14,000 miles.

Reply.—The trouble may be due to the fact that the muffler is not fastened tightly upon the muffler pipe. Again it may be caused by the use of heavy fuel such as is now on the market. This heavy fuel question is taken up in full in the March issue of the Automobile Dealer and Repairer, and we would advise you to read it through. Try to locate the knock more definitely or disconnect the muffler and remove it from the car. If the knock is still evident, disconnect the exhaust tubing on the muffler and if the knock still persists examine the connecting rods and piston. Let us hear what the results of the experiments are.

Your friend's trouble with the 1917 Overland is probably due to the fact that at some time or other he has tried to mesh the gears with the clutch engaged and has bent over the edges of the teeth. Tell him to make a careful examination of the second speed gears and see if the teeth are smooth. Trouble of this sort is sometimes caused by lack of oil in the clutch shifter yoke and bearings. This trouble can be located easily by trying to turn the clutch while it is disengaged. If it does not turn smoothly, it is an indication that the bearing needs repairs or needs grease.

Good Word For Johnson.

From L. A., Rhode Island.—I don't usually do very much talking about different things that I try on my automobile or in it, but not long ago I noticed one of your ads about Johnson's Carbon Remover, so I decided to take a shot at the stuff because my old engine had not been giving just the best results and I did not want to pay two or three dollars for having the carbon removed. I decided to take two or three days off and fix up the machine so long as I had started, so I went down to the accessory dealer and bought a can of Johnson's Carbon Remover. I followed directions, and after I had used it I removed the cylinder head and looked at the cylinders. That liquid certainly did the work, because the cylinders and firing chambers were just as clean and smooth as they could be. I thought that if all of Johnson's products were as good as his carbon remover I would try some more of them when I needed to.

I tightened all the loose bearings, cleaned out the crank case with kerosene, put in some fresh oil, cleaned up the radiating system and put on some new hose connections. I flushed the radiator out with a sal soda solution, leaving the solution in and running the engine until it became good and hot. Then I cleaned the solution out by flushing with clean, fresh water.

I guess that the sal soda solution must have taken out something besides the dirt in the radiator, for it had three or four small leaks, where the tubes were joined to the upper and lower parts. Leaks were not very bad, but they worried me so I took a chance on Johnson's Radiator Cement. The dealer told me that the stuff would not interfere with the circulation of the water, and I guess he was right, for although it stopped the leaks it didn't seem to stop up any of the pipes. I pulled apart the transmission and replaced the brake bands and was obliged to put in two new gears, and if anybody has ever put in a Ford transmission gear they know

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what a job it was, but I finally got it together all right so that it worked all right. I fixed up the rear axle and put in new grease.

In all I guess I spent three whole days on the job, but it certainly repaid me, because the car ran almost as well as it did when I first bought it. I had a friend come over from the garage to help me out on some of the adjustments, for I believe in having things done right, and I don't know everything about a car yet, even though I have driven one for five years.

I was not quite satisfied with the looks of the car, for its dress did not go with its works, so I washed it carefully from top to bottom and looked it over again. In many places the paint had been scraped off and the Ford looked pretty old to me. So I took some fine sandpaper and smoothed up all of the rough spots. I gave the body a coat of Auto-lak and put some Black-lak on the top and side curtains, and this made the old bus look new again.

Now I believe in doing people that help me a good turn, so when anyone asks me what to use on their car I always tell them to write the S. C. Johnson & Son Company, and as they advertise in your paper, I thought perhaps you might want to publish my letter. If any of your subscribers want to know anything more about Johnson's preparation tell them to write to me.

Our reader did not want his name published, but the letter was so good that we decided to publish it. We are glad that our subscriber is so satisfied with one of our advertiser's products.—Editor.

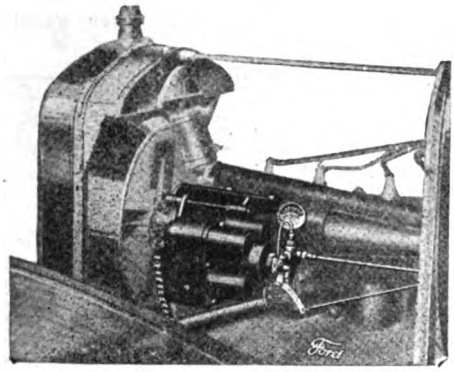
NEW AND INTERESTING THINGS IN MOTORDOM

Tire Mileage Book.

How long will a tire last? This is a question which the Racine Auto Tire Company of Racine, Wisconsin, manufacturers of auto tires, proposes to have customers answer by means of a clever mileage record which they are distributing through their dealers. The book is designed to inspire car owners to keep a record of the service given by each tire. It is so arranged that, although almost every accident that can happen to a tire may be noted, the book is small enough to slip into a bill case. It seems to be a good idea well worked out, and shows the faith the Racine Auto Tire Company has in its product.

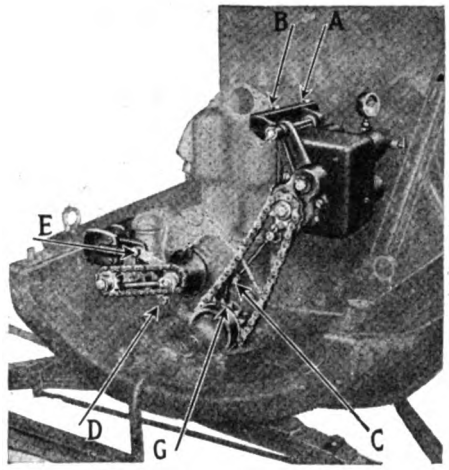
Aero Starter.

There are two things about automobiling that are the bane of every Ford owner's existence, cranking the engine and pumping the tires, and it would seem that the New Starter Manufacturing Company, 1901 Western Avenue, Chicago, Ill., have offered a solution, by the introduction of their aero starter. This device is a radical innovation in the starting system line and consists of two units, the air pump, with regulator, and the starting motor. The air pump, air compresser as it is termed, automatically maintains pressure of 200



Showing Rear View of Aero-Starter As Mounted on Ford Engine.

pounds in an electrically welded storage tank, which is tested to 600 pounds, and automatically stops when the pressure is reached. This unit is mounted high on the side of the engine and is driven by a sprocket chain. The air engine, which is in operation only at the time of starting, drives through a sprocket chain and takes the pressure for starting from the storage tank. With the outfit is furnished suitable length of tubing for inflating the tires. The whole outfit is



Showing Front View of Aero-Starter and Air Compressor. Letters Indicate Ford Bolts Used in Mounting on Engine.

extremely simple and the installation can be made by the average mechanic in from two to four hours. The installation of this device requires the boring of no holes in the engine or cylinders, the regular Ford bolts being used in every case.

Thrift Stamp Day.

Every reader of the Automobile Dealer and Repairer is requested to do his part in making the first day of May a success as Thrift Stamp Day. Every person, who makes a purchase on that day, is supposed to accept at least one thrift stamp as change and to invest as much money as possible in stamps.

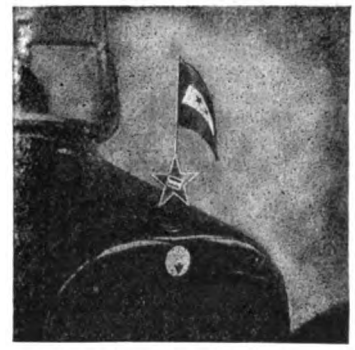
Guaranteed Tractor.

Doubtless many of our readers, this coming season, will do considerable work in the cultivating line. Again, many of our readers may be interested in machinery for farming work, and we want to call their attention to the guaranteed tractor made by the Guaranteed Tractors, Inc., 2700 Michigan Avenue, Chicago. This device is of great interest because it may be attached to any one of a great number of the popular cars on the market today and makes a tractor of practically any automobile. The whole device consists of two large internal drive tractor wheels attached to suitable frame which is clamped to the rear axle of the passenger car after the regular wheels have been removed. In place of the regular wheels special small gears are attached, these gears meshing with the tractor wheels. The manufacturers claim that, with this device on a small car of from 20 to 25 horsepower, an equivalent of four horses' work may be obtained, for drawing plows, harrows or other farm implements. The gear reduction through the wheels is eleven to one and, when taken in conjunction with the average gear box, offers a very high gear reduction, giving considerable pulling power.

The Guaranteed Tractor may be attached by practically any mechanic in a minimum amount of time and requires but very little alteration to the car itself.

Liberty Star Flag Holder.

For the patriotic automobile owner, the Liberty Flag Holder Company, 60 Grand Street, New York City, are supplying a Liberty Star Flag holder and a silk American flag at a very low



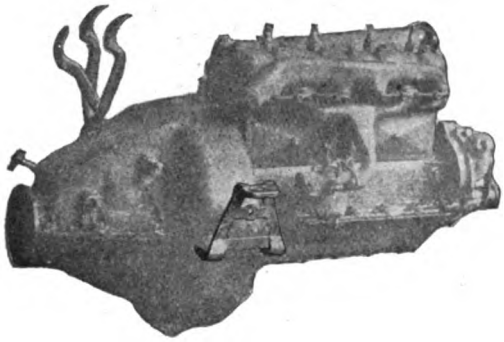
Liberty Star Flag Holder.

price. This flag holder attaches to the radiator cap of practically any machine and is in the shape of a five-pointed star. The upper three points of the star are arranged to take a small flag staff.

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Crank Case Repair Arms.

The Hudson Motor Specialties of Philadelphia, Pa., for some time have been manufacturing their crank case repair arms, which are designed in such a way that they may be hooked beneath the



Crank Case Repair Arms.

flanges projecting from the Ford flywheel bell housing, and bolted to the chassis. These arms were designed to meet the demand for a quick repair attachment which would eliminate the necessity for removing the whole engine should the crank case retaining arms be broken. The manufacturers now announce that the design has been changed, so as to permit the use of the arm on the Ford one-ton, worm-drive trucks.

Copeman Lubricating System.

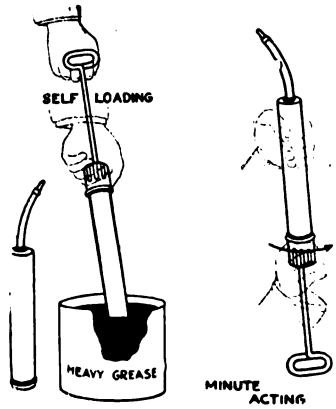
Something distinctly novel in the lubricating line has been introduced by the Copeman Laboratories, Inc., of Flint, Michigan, in the Copeman Lubri Cups. This system is designed to be placed on any bearings fitted with ordinary grease cups and is claimed to give great efficiency. The caps themselves are made of heavy metal and are ornamental in appearance. The caps are fitted with a heavy feed screw which actuates a grease forcing plunger. The feature of the device is the lubri cup, which is a specially manufactured paper capsule containing a high-grade hard grease, which is placed inside the cap, forming an air-tight grease chamber. When the feed screw of the cap is turned, a pressure of 745 pounds to the square inch is developed, forcing the grease into any bearing.

Tire Repairing Booklet.

The Akron Rubber Mold & Machine Company of Akron, Ohio, have recently published a little book entitled "Tire Repairing, the Business of the Times," in which they give the reasons why tire repairing today is a lucrative as well as useful occupation for the automobile man. Among other things they say that there is room at present for at least 5,000 more tire repair shops in this country, and they give a number of suggestions for conducting a tire repair business in their little booklet which may be obtained upon request.

Wonder Minute Gun.

Something distinctly new in the line of grease and oil guns is manufactured by the Sidell Rattner Manufacturing Company, 3135 Broadway, Brooklyn, New York. This device is termed "The Wonder Minute Gun," and will handle the heaviest grease as well as the lightest oil with equal facility. It is made of two steel tubes which telescope into each other and is secured by a patented tapered grip which locks the shell to the container firmly with a single motion.

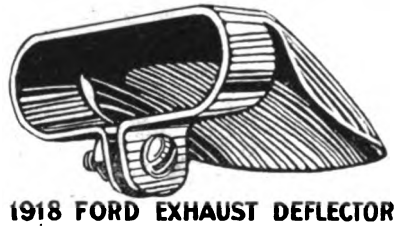


Wonder Minute Gun.

The cylinders measure 1¼ and 1⅝ inches in diameter. The illustration shows how the gun is used, as well as its construction.

Exhaust Deflector.

A. P. Worthington of 700 No. Main Street, Los Angeles, California, market an exhaust deflector for the Ford car. This deflector is designed to prevent the exhaust gas and carbon formations from depositing on the underneath side of the



1918 FORD EXHAUST DEFLECTOR

Ford body and the frame. It is made from heavy steel and fits the 1918 Ford muffler casting. Where a tire or a suit case is carried at the rear of the machine this deflector prevents the exhaust from spoiling the tire or damaging the suit case.

Safety Tail Light.

The King-Bull Manufacturing Company, at 123 East Ontario Street, Chicago, Illinois, have recently brought out something novel in the way of a safety tail light. This device is a combination of tail and illuminating light. The ordinary tail light is arranged to show red at the rear and to illuminate the number, while a second and larger light is controlled by a switch from the driver's seat and throws a beam of white light fifty feet back of the car, the full width of the road. This light is only used while the machine is being backed or when the driver desires to see the road in back of the machine.



Safety Tail Light.

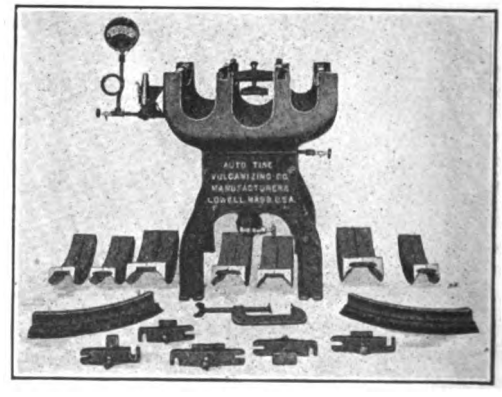
The Currier Tiller.

The Farmers Mutual Plow and Tractor Company of St. Louis, Missouri, are now building a truck gardener's tractor which is termed the Currier Rotary Tiller and weighs only 125 pounds. The engine is connected directly to the rotary shaft, upon which the spiral plates for tilling are attached, and revolves 250 revolutions per minute. There is no connection between the engine and the wheels. The propulsive power is had through the action of the cultivator in forcing the soil back, and is said to be ample. In this principle very little weight is necessary for the machine itself and so it may be operated at a minimum amount of cost.

Anyone interested in this machine should write the manufacturers for literature and prices. No doubt this year will see a great advance in the farming line and garage owners should make arrangements for opening agencies for such tractor devices.

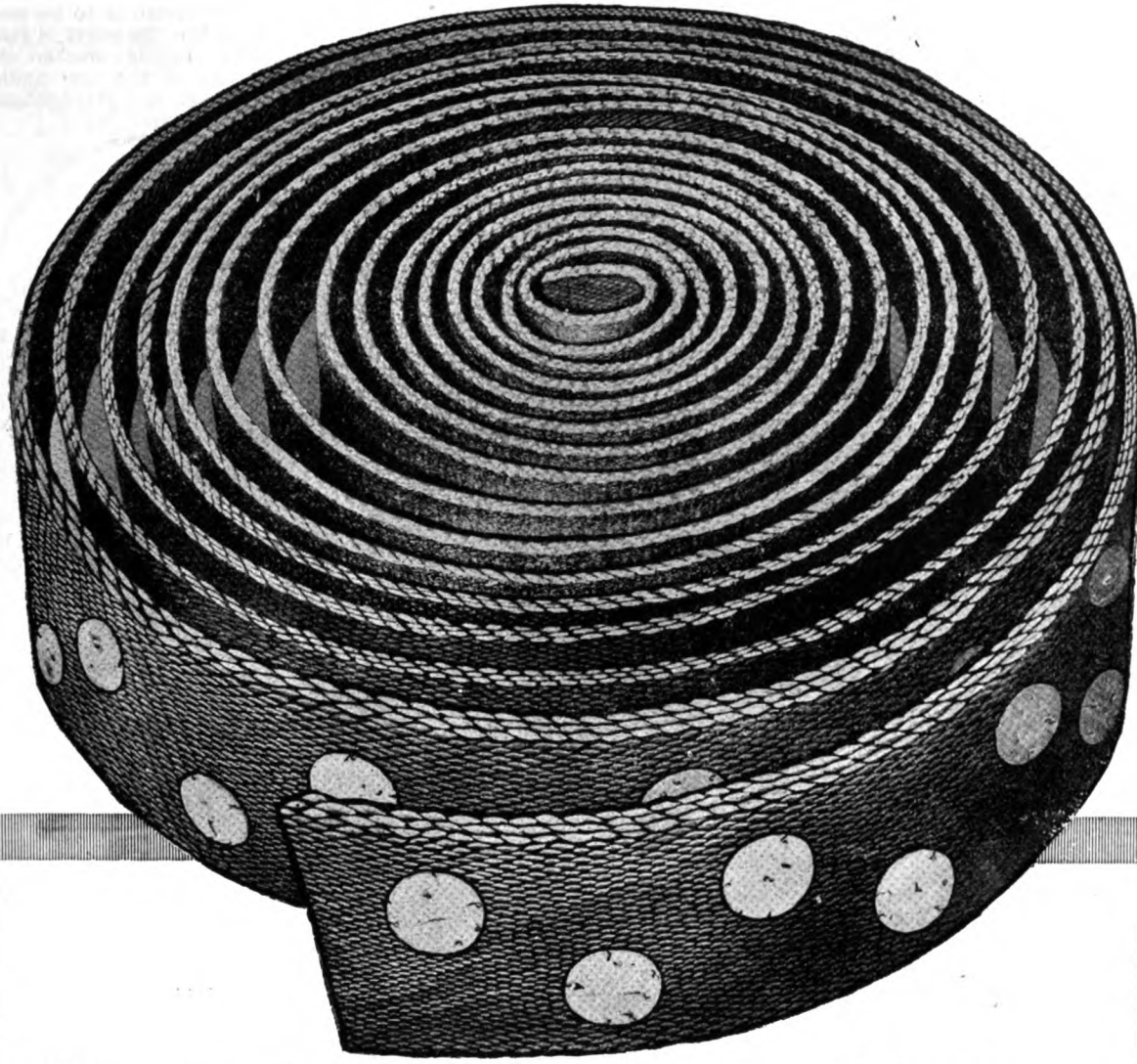
The Three Cavity Vulcanizer.

We have called the attention of our readers, repeatedly, to the field open in tire repairing. This branch of the automobile business affords quick and ready profits and should be investigated. An interesting vulcanizing outfit, model No. 8, is sold by the Auto Tire Vulcanizing Company of Lowell, Mass., and is designed for general vulcanizing of clincher or straight side tires, from three inches to five inches in diameter. Our illustration shows the outfit complete with steam gauge, safety valve, clamps and bead molds. The vulcanizer illustrated is fitted with a gas burner for generating steam pressure, but the same machine may be obtained without the burner for connection with a steam generator. Should the shop not be equipped with illuminating gas, either gasoline or kerosene may be used as desired. Extra moulds may be obtained at additional prices.



The Three Cavity Vulcanizer.

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Cork Insert Brake Lining

gives a SURE brake ALL the time

3 Big Points of Superiority

1 Less pressure required on pedal

Cork Insert Brake Lining has by far the highest co-efficient of friction of any lining. It *takes hold* firmly at the slightest touch of the toe to the brake pedal. Less pressure means less heat, longer wear, more positive service.

2 Unaffected by oil or grease

Oil on ordinary lining, destroys its ability to *hold*. Makes it undependable and dangerous. Cork Insert Brake Lining is not affected by oil or grease. It is always *dependable* —always can be relied on to *take hold* instantly—positively.

3 No grab, slip or SQUEAK

Cork Insert Lining never glazes over or gets slippery—insures freedom from grabbing and slipping. Both corks and lining wear very slowly. It gives a longer service than any other lining and holds its high frictional qualities and original efficiency to the last mile.

DEALERS! Here's another big money maker for you. The success of Cork Insert Transmission Linings and Fan Belts for Fords is being repeated *in an even bigger way* in Cork Insert Brake Lining. It is handled by the same jobbers who handle the other Cork Insert products. Get this lining in stock for it is *going big.*

ADVANCE AUTOMOBILE ACCESSORIES CORP.

Dept. D-5, 56 E. Randolph St., Chicago, Ill.



Makers also of
Cork Insert Transmission Linings for Fords and Fan Belts for Fords



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Esta Water Auxiliator.

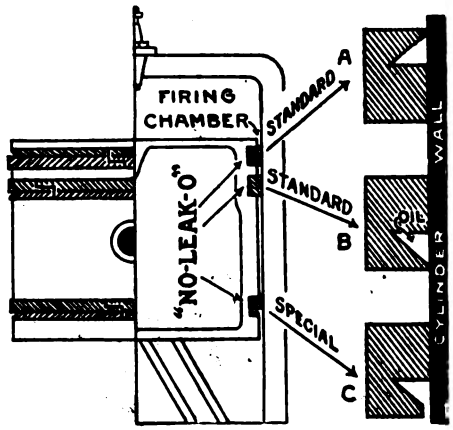
Every motorist realizes that 50 per cent. of his engine troubles may be traced to carbon. Carbon accumulates in the explosion chamber, reduces the volumetric efficiency, prevents the functioning of the valves, causes preignition and often results in the scoring of cylinders and the necessity for expensive repairs. For a long time engineers have been working upon a device for the prevention of carbon and many of them agree that the introduction of water vapor into the cylinders with the fuel has a tendency to cut down, and in some cases eliminate carbon trouble. Upon this vapor principle the Esta Water Auxiliator Company, Inc., 1838 Broadway, New York, have designed their water auxiliator, which they claim is a practical solution for the carbon problem.

This device consists of a water tank and suitable tubing and connections which may be attached to practically any engine now on the market. In the top of the tank is a filling tube which extends down to within a short distance of the bottom and at the bottom of this is an annular opening. The front of the tank is fitted with a circular glass face through which the water level may be observed. When the engine is in operation the partial vacuum in the intake manifold draws air down through the filling tube of the accelerator in the form of extremely small bubbles. This air in passing through the water becomes heavily laden with moisture and passes through the connecting tube to the manifold and the cylinders. The tank may be attached to any part of the engine or body where it is convenient for filling.

The manufacturers claim that with this device properly installed, the engine operates more smoothly at a decreased cost, with increased speed and power and with no carbon deposits in the cylinders. The reason for the increase in power has been explained by saying that the water vapor upon reaching the hot cylinders is disintegrated or broken up into its original elements of oxygen and hydrogen, forming an explosive gas combination, which adds to the explosive power of the fuel.

No-Leak-O Piston Ring.

Perhaps no problem today is greater than that brought forth by the leakage of oil past piston rings. Many engine designers have tried to solve the problem, and the Automobile Accessories Company of 1824 West North Street, Baltimore, Md., are producing an oil cylinder ring which in their opinion is a solution of the problem. These rings are individually cast from a special formula of close grain, tough, gray iron. By a special patented process uniform



No-Leak-O Piston Ring.

tension is produced, without hammering or peening. The joint is of the step-joint type and the lower edge has a channel cut around it, the upper side of which is at right angles to the ring face. At an angle of forty-five degrees to this is the lower side of the channel. The manufacturers claim that this V-shaped channel picks up the oil, which has splashed from the oil base, and distributes it around the circumference of the cylinder. Excess oil on the cylinder walls is scraped off by the upper edge of the channel. This means that the groove at all times is practically full of oil, forming a tight seal for the firing chamber.

Foamite Fire Pails.

Every garage man, or automobilist, realizes the difficult task one has in extinguishing burning gasoline. The Foamite Fire Extinguisher Company of New York have recently put on the market a fire pail, which would seem to be of great interest to every garage owner, as well as every automobilist. This fire pail, from outside appearances, resembles an ordinary tin pail but differs, in that it is fitted with a separate compartment in which is contained a solution of aluminum sulphate. The outer compartment contains the Foamite compound.

When the device is to be used for extinguishing fire, the cover is removed and the contents forcibly dashed on the fire. The mixture of the two liquids causes them to expand and form tough, durable,



Foamite Fire Pail.

fire smothering foam composed of minute bubbles of carbonic acid gas, sufficient to cover an area of 50 square feet. Foamite is said to coat all solid burning materials such as wood, cloth and paper, and floats on volatile liquids, extinguishing all fires and making re-ignition difficult.

Anthony Tire Pump.

A pump which should be of interest to every automobile owner who has had experience with troublesome and leaking air devices for inflating tires is known as the Anthony tire pump. There are many features which deserve consideration, the most important of which is the valve mechanism. This valve is made entirely of metal and is guaranteed by the makers to be 100% efficient. The barrel is made of seamless steel tube, fitted with a malleable iron base, and a cast brass cap with a long bearing for the piston rod. The piston rod is 7/16 steel and will not bend or spring under the hardest service. This pump is made in five sizes and is guaranteed by the manufacturers, the Anthony Company, 138 West Avenue, Long Island City, New York, to give satisfaction.

Do you know what scientific management means as applied to the financial end of your business, or are you going along in the old ox cart ways of a century ago? Don't be satisfied that everything at this end of your business is O. K. unless you know what you are talking about and have consulted some one who knows more about it than you do.

Made from Oil-Tempered Spring Steel Wire



They Remove Carbon Where Others Will Not

PATENTED MARCH 28, 1916



Cut out experimenting—get down to business. Why not own a set of FLEXIBLE CARBON SCRAPERS? They are the only scraper on the market that will do a satisfactory job without taking the motor to pieces. Compounds are dangerous. All good mechanics advise scraping carbon. Over 100,000 sets now in use by Auto Mechanics.

Ask Your Dealer or Write

Flexible Carbon Scraper Co. 1421 W. Washington St. Los Angeles, California

NO-LEAK-O

NO CARBON—LESS FUEL—MORE POWER

Seven years of successful growth. Reputation gained through actual service. Results and popularity of NO-LEAK-O Piston Rings have brought out imitations. There are none "just as good"—insist on the original NO-LEAK-O—The successful grooved Piston Ring. All NO-LEAK-O Rings are oil-controlling rings. That's why they are superior to any other ring. Write for free booklet. Popular sizes 50c. Guaranteed to give satisfactory service or money back. Discount to the trade. If your jobber can't supply you, order direct.



See that groove controlling the oil?

DISTRIBUTING POINTS—Boston, Hartford, New Haven, New York, Brooklyn, Elmira, Buffalo, Newark, Baltimore, Nashville, Cuero, Tex., Clinton, Okla., Akron, Cleveland, Columbus, Cincinnati, St. Louis, Denver, San Francisco, San Diego.

AUTOMOBILE ACCESSORIES CO., 824 W. North Ave., Baltimore, Md.

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No Nib—
No Bolt

No Squeak-
No Jolt

Win the Lasting Confidence of your Customers

By selling Titanic values in safety, economy and sureness. The biggest possible seller backed by proved superiority—tested on every kind of car and winning over all other springs wherever used. More replacements are actually made with Tuthill Titanics than all the others combined.

GUARANTEED
TUTHILL TITANIC SPRINGS
LUBRICATED



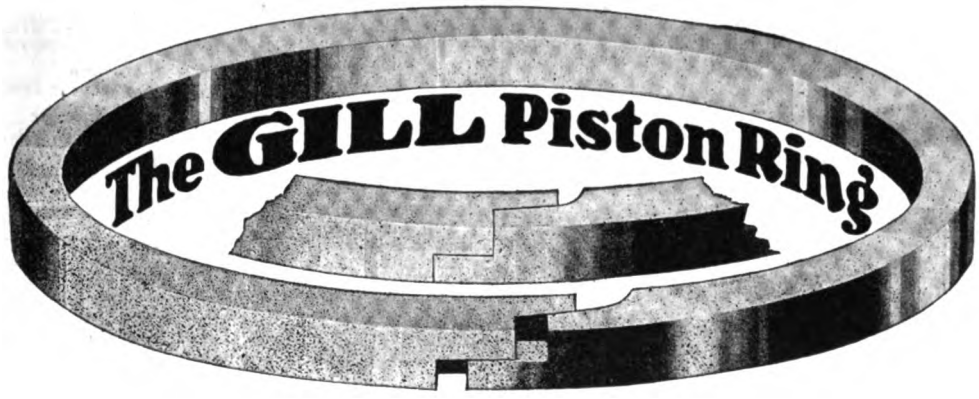
Representative stocks are carried at 60 selected centers with a factory reserve of 65,000. Every distributor is equipped to give quick service.

Write for complete 1918 list of springs.

TUTHILL SPRING CO.
(Established 1880)
760 POLK STREET, CHICAGO, ILL.

Guaranteed Forever
Against Center Breakage

PERFECT POWER FROM EACH PISTON



A ONE-PIECE PISTON RING

GILL PISTON RINGS are self fitting, ONE-Piece rings of sturdy construction. They have a distinctive joint which absolutely prevents the escape of compression, the formation of excessive carbon, or the pumping of oil into the combustion chamber.

ASK YOUR DEALER for GILL PISTON RINGS, or write us today.

GILL MANUFACTURING CO., 351 W. 59th St., Chicago, Ill.

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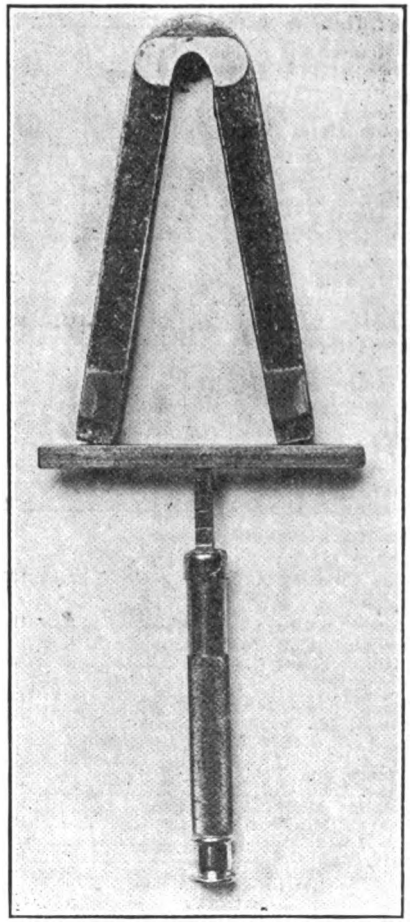
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Bowers Magnet Tester.

A handy device for the motorist or the garage man is manufactured by the Bowers Manufacturing Company of Grand Rapids, Michigan. This device is a combination magnet, compression and air pressure testing and indicating gauge, and is illustrated herewith as used to test the amount of magnetism in a Ford magnet. The tube is hollow and is so arranged that it may be put in the place of a spark plug. When the engine is turned over the actual pounds compression is indicated on the gauge at the top of the device. In a similar manner it may be used to determine the pressure of air in pneumatic tires. Magnetism is measured by the amount of holding power which the magnet retains and is found by placing the bar at the top of the indicator across the poles of the magnet. This instrument does all of the guess work in making tests of these three kinds.



Bowers Magnet Tester.

Ten Eyck Starting System.

The Ten Eyck Starting System, manufactured by the Air Device Company, 2975 Cottage Grove Avenue, Chicago, Illinois, is something entirely new in the way of engine starters and consists of a single cylinder air pump driven direct from the crank shaft by a roller chain; a storage tank with suitable valves and connections, and a distributing valve arrangement, attached to the engine cylinders. While the engine is running, air is pumped into the tank. During the day and while in operation, pressure is maintained by an ordinary check valve. If the machine is to be left any length of time, however, a second valve, called the night valve, is closed, thus keeping the air in the tank. In starting the engine, air pressure is admitted to the cylinders through a distributing valve which is timed to admit air pressure to the cylinders in their firing order. Under ordinary conditions the air pressure will turn the engine over at approximately 350 revolutions per minute. The manufacturers claim that from 12 to 20 starts can be obtained from the storage tank when it is charged with the full pressure of air. The device is also used in pumping up tires, the compressed air in the tank being utilized for this purpose. At present it is designed especially for the Ford car.

Automobile Instruction.

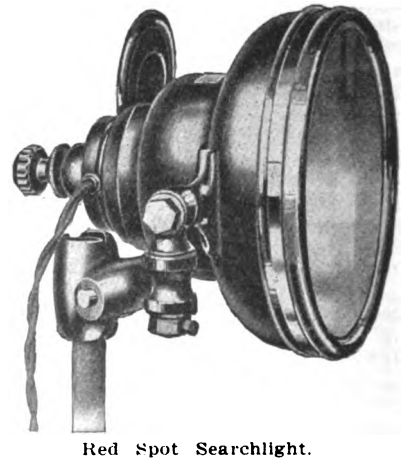
The Michigan State Auto School, Inc., 687 Woodward Avenue, Detroit, Michigan, has been giving instructions in automobile work for a number of years and has added, recently, branches of instruction in tractor work, welding, specialized tire repairing, and aeroplane instruction and maintenance. This school has an enrollment of 685 students and preparations are being made to accommodate a greater number for this coming year.

Painting Outfit.

The automobile owner who is interested in restoring the finish of his car and obliterating the marks of last winter's usage should investigate the Simple Painting System,, manufactured by F. O. Pierce Company, 12 West Broadway, New York City. This system is designed so that it can be applied by practically any car owner and is put up in sets complete with brushes. The materials used as well as the methods are identical in qualifications with the methods used by automobile painters. The different finishes are put up in ready mixed form. The manufacturers have had fifty years of business experience in catering to the wants of painters and they claim to give the automobile painter the benefit of this vast experience.

Red Spot Searchlight.

A larger and more powerful Red Spot Searchlight has just been brought out by F. W. Wakefield Brass Company, Vermilion, Ohio. This new searchlight is seven inches in diameter and has a strong 30-candle power lamp, being especially adapted to road work. Red and white rays are interchangeable merely by pressing a button so that the light may be used one instant as a danger signal and the next instant as a white light of extraordinary power.



Red Spot Searchlight.

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Classified Advertisements

Under this head will be printed advertisements of **Second Hand Cars Wanted or for Sale, Accessories of any kind Wanted or for Sale, Shops for Sale or Rent, Situations or Help Wanted, Second Hand Tools or Machines for Sale or to Exchange,** at the uniform price of **five cents a word,** including the name and address, for each insertion, payable in advance. **No advertisement will be inserted for less than 75 cents, however small.** Remittances may be made in postage stamps or in any convenient way.

Special rate of 30 cents per nonpareil line for each insertion if taken for 12 consecutive times.

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QUALITY SUPREME

PRICES RIGHT

✣ ✣

All sizes in stock

✣ ✣

Interesting proposition for agents

✣ ✣

Houpert Machine Co.

355 West 52nd Street

New York, N. Y.

Tires

PRICE WRECKERS

Double Tread Tires with Double Lock Stitch

30x3	N. S.	$5.50		34x4½	N. S.	$8.50	
30x3½	"	6.50		35x4	"	9.00	
32x3½	"	7.00		36x4	"	9.50	
31x4	"	7.25		36x4½	"	10.00	
32x4	"	7.25		36x5	"	10.00	
33x4	"	7.50		37x4½	"	10.00	
34x4	"	8.00		37x5	"	10.00	

We carry a full line of Firsts and Factory Blemished Tires and Tubes at moderate prices.

ROYAL TIRE EXCHANGE

282 Halsey St., Newark, N. J.

INSYDE TYRES,

inner armor for automobile tires. Double mileage. Prevent punctures and blowouts. Details free. Agents wanted. Big profits.

AMERICAN ACCESSORIES CO., Dept. AD3, Cincinnati, Ohio

CHEAP DOUBLE TREAD

NEW AND SECOND HAND

Tires and Tubes

Write for Prices

JAFFE BROTHERS

260 West 54th Street NEW YORK CITY

Tires

BUY EARLY AND SAVE MONEY

Double Tread Tires and Tubes

GUARANTEED

Come to the Tire Clearing House—here are prices—clear cut and plain as daylight. We buy wholesale the best "try out" Tires—and you get the benefit—you want truthful tires, and truth is never crushed to earth if given a square deal—real truth is puncture proof—

SO ARE OUR TIRES.

Size	Plain	Non-Skid	Tubes
28x3	$4.40	$4.95	$2.00
30x3	5.50	6.05	2.00
30x3½	6.60	7.15	2.50
32x3½	7.15	7.70	2.75
34x3½	8.25	8.80	3.00
30x4	7.70	8.25	2.75
32x4	8.80	9.35	3.00
33x4	8.80	9.90	3.50
34x4	8.80	9.90	3 50
35x4	9.90	11.00	3.60

Get your order in quick for goods listed here—by all means get in touch with us for further information about our special process—it means money in your pocket. Get in right—write today—yes—today.

Look up rating in Dunn's or Bradstreet's.

Size	Plain	Non-Skid	Tubes
36x4	$9.90	$11.00	$3.60
32x4½	9.90	11.00	3.75
34x4½	11.00	12.10	4.00
35x4½	11.00	12.10	4.10
36x4½	11.00	12.10	4.25
37x4½	12.10	13.20	4.35
34x5	11.00	12.10	4.50
35x5	13.20	14.30	5 00
36x5	13.20	14.30	5.00
37x5	13.75	14.85	5.00

For (non-skid) sizes up to 32x4, 50c extra; all other sizes $1.00 extra.
For rebuilding your old tires we charge you 60% of the above prices.

B. LIBEN & COMPANY

261-A West 54th Street NEW YORK CITY 112-A East 110th Street

THE HOME OF DOUBLE TREAD TIRES

Exceptional Values

IN

DOUBLE CHAIN STITCHED TIRES

Size	Plain	Non-Skid	Size	Plain	Non-Skid
28x3	$4.50	$5.00	35x4	$10.00	$11.00
30x3	5.50	6.00	36x4	10.00	11.00
30x3½	6.50	7.75	34x4½	11.00	12.00
32x3½	8.00	9.00	35x4½	11.00	12.00
31x4	9.00	10.00	36x4½	11.00	12.00
32x4	9.00	10.00	37x4½	11.00	12.00
33x4	9.00	10.00	35x5	11.00	12.00
34x4	10.00	11.00	36x5	12.00	13.00
			37x5	12.00	13.00

Have your own tires Double Treaded by the same process. Our charges are only 40% off the above mentioned prices.

Send your order to our nearest office.

LEON JAFFESS, Inc.

252 West 55th Street New York City

6106 Euclid Avenue Cleveland, Ohio

Double Tread Tires

Notice Our Prices Before Going Elsewhere

PRICE LIST

Size	Plain	Size	Plain
30x3	$5.00	35x4	$9.00
30x3½	5.50	36x4	9.50
32x3½	6.50	36x4½	10.00
32x4	7.00	36x5	10.00
33x4	7.50	37x4½	10.00
34x4	8.00	37x5	10.50
34x4½	8.50		

For Non-Skid, 50 cents more on all sizes.

We Carry a Full Line of New and Used Tires & Tubes

GINSBERG & BERKOWITZ, Inc.

236 WEST 48th STREET, NEW YORK

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Wonderful Opportunity!

Write for Catalogue on

DOUBLE TREAD TIRES

Also New Tires All STANDARD Makes

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It will pay you to do business with us. Thousands of satisfied customers are sufficient proof of our fair method of doing business.

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AFFA SPECIALTIES

For FORD and Other Cars. They stop the rattles in the Steering Spindles, the Brake Rods, the Clevises, the Control Rods.

AFFA SPECIALTY COMPANY
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SPECIAL PRICES
ON
Ford Specialties

Write us your requirements and we will quote special price for stock on hand.

General Automobile Supply Company
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NOTICE, REPAIRMEN!—If you repair Ford cars you need our line of cylinder reamers, motor stands, quick-raising jacks, portable hoists, straightening presses, speed tools and wrenches. Geneva Machine Works, Geneva, Indiana.

VULCANIZING Auto Tires is a growing business. Our plants are easy to learn to operate. Cat. is free. You save 30%. Instruction book on vulcanizing 75c. Equipment Co., 304 Eighth St., Cincinnati, Ohio.

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MODEL FRAME 209R
6-volt with regulator and cutout.
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$25.00
For the Trade Only.
Send for Complete List of Other Bargains
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Salesmen calling on Automobile, Motor Truck and Motorcyle Dealers for a prominent side line.

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AUTOMOBILE INSTRUCTION—The West Side Y. M. C. A. Automobile School gives a practical course in shop and road practice in four or eight weeks, day or evening. Provision made for out of town men. 322 West 57th St., New York City.

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PERSONAL—PILES and ECZEMA make life miserable. Why suffer? Mention your trouble and send address for immediate help. G. A. Stokes, Mohawk, Florida.

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Those Requiring the Very Best in

CYLINDER GRINDING

fitting with light grey iron pistons, leakless rings, hardened and ground pins, our work has no comparison with the ordinary, now obsolete heavy type pistons and rough boring jobs. We grind our cylinders to one-half thousandths, mirror finish. We grind our pistons on the highest grade machines to fit, two and one-half thousandths clearance. We use the McCadden leakless piston rings. Work all reassembled ready for installation. All work positively guaranteed.

Patterns and castings in stock for every make of motor.

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Quality work. Get our prices.

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ESTABLISHED 1897.
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CYLINDER GRINDING on automatic machinery by skilled mechanics at prices that will interest you. Gears, axles, valves and parts of all kinds made of high grade alloy steel. Send us your worn or broken parts and we will replace them. Oxy-Acetylene Welding. Cracked cylinders a specialty. Adapt Machinery Co., 1632 So. Wabash Ave., Chicago, Ill.

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WE REPAIR Lamps, Radiators, Windshields and Fenders, of every description. Largest repair plant in New York. Great accessory bargains on hand for immediate delivery.
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STODDARD DAYTON PARTS
Pullman & Regal Parts
rear axle bevel gears and pinions
These are all new parts.
THE DAYTON AUTO PARTS CO.
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SAVE 50% TO 75% ON PARTS—Parts for Pope-Hartford, Columbia, Reo, Buick, Overland, Chalmers, Mitchell, Thomas, Oldsmobile, Maxwell, Stoddard-Dayton, Stevens-Duryea, Corbin, Cadillac and all others. Eiseman, Splitdorf and Remy magnetos, $5.00 to $10.00. Bosch high tension magnetos, $15.00 to $25.00. Also the Mea, Connecticut National, U. & H. and K. & W. magnetos in stock. Springs, wheels, axles, etc., for all cars. Connecticut Auto Parts Co., Inc., 1070 Main St., Hartford, Conn.

Wanted

WANTED.—Parts for model O. O. White Steamer Automobile. Maddox Foundry & Machine Co., Archer, Florida.

WANTED—Truck 3½ tons; state make, age, condition and spot cash price. Benton, Box 416, Livingston Manor, N. Y.

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Hecht's Magneto Exchange
Dealers in Magnetos of all Makes.
Lighting Systems and Self Starters.
Expert Repairing of All Makes.
Express your Magneto, Starter and Generator to us. Same will be repaired and returned same day as received.
Distributors and Service Station for
Berling Swiss, Heinze, National and Michigan Magnetos
— Also —
Esterline Generators, Norma Ball Bearings and all kinds of Parts carried in stock for all makes of Magnetos
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USED MAGNETOS
Bosch High Tension, $15 up
Save 50% to 75%
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PATRIOTIC NOVELTY
EVER PRODUCED!
Retails 50c each. (Positively none free). Everybody wants one. They can't help it. Big discount in quantity lots. Great Agent's Seller! A great premium for any line of business. Quick action on your part means big money for you.
H. S. HARTZMAN & CO.
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ONE MINUTE PLEASE
Stop Wasting Gasoline

Use the Automatic Funnel that stops running when the tank is full.

Do you overflow the radiator when filling? The Automatic funnel stops this also retaining the remainder of the liquid in the funnel which can be carried away without dripping.

Any kind of liquid can be used in this funnel which is guaranteed to work automatically or money refunded. Costs no more than an ordinary funnel and can be used in every household.

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Agents Wanted Patent applied for
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PYRMA ALUMINUM HEEL PLATES cover or prevent unsightly holes in floor board coverings, 75 cents each. These plates and PYRMA ALUMINUM MATTING for sale by all up-to-date dealers. Metallic Automobile Matting Co., Rochester, N. Y.

FOR SALE—Various makes of 4, 6 and 8 cylinder Magnetos, headlights, sidelights and searchlights for automobiles which have been used for experimental work. Also several types of watthour meters which have been used for testing purposes. Write for particulars to P. O. Box 1027, Rochester, N.Y.

FOR SALE.—Gasoline tank and pump, retreading molds, upright coal burning boiler suitable for Vulcanizing plant, and cash register. Vanderpool Co., Springfield, O.

FOR SALE—Pedal Pads and Fan Control Springs for your Ford Car. Prices right. Address Arthur Beers, Bradley Beach, N. J.

FOR SALE—One Miller Power Tire Wrapping Machine in perfect order, $100.00 F.O.B. New Orleans. Duval Tire Rebuilding Co., 341 Baronne St., New Orleans, La.

FOR SALE—6 H. P. Otto Gas Engine in Excellent Condition. 2055 S. 57th Street, Philadelphia, Pa.

Agent Wanted

AGENT WANTED—To represent English manufacturer in patent Motor-car Accessories. Apply H, Box 654, New York.

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Patent Attorneys

PATENTS SECURED—C. L. Parker, Patent attorney, McGill Building, Washington, D. C. Inventor's Handbook upon request.

PROTECTIVE PATENTS PROCURED PROMPTLY—Blue Book on Patents sent on request. Trade-Marks Registered. Robb & Robb, 288-292 Southern Building Washington, D. C.

RALPH N. FLINT, M. E.—Attorney-at-law in Patent Causes, late Assistant Examiner Internal Combustion Engine Division, U. S. Patent Office. Specialist in Internal Combustion Engine Cases. 2 Rector Street, New York. N. Y.

WANTED—AN IDEA! WHO CAN THINK of some simple thing to patent? Protect your ideas; they may bring you wealth; write for "Needed Inventions" and "How to Get Your Patent." Randolph & Co., Dept. 251, Washington, D. C.

IMPROVEMENTS WANTED—Send for free bulletins and advice. Book "INVENTIONS—PATENTING & PROMOTING" Free. Lancaster & Allwine, 212 Ouray Building, Washington, D. C.

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Rectifiers

RECTIFIERS to charge from A-C circuit 1 to 8 ignition lighting or starting batteries at one time, $12.00 upward. American Battery Co., 1136 Fulton St., Chicago, Ill.

Klear-Sight Windshield Cleaner

The Alcemo Manufacturing Company of Newark, New Jersey, are manufacturing what is termed the Klear-Sight Windshield Cleaner. This device is designed to slip over the top of any windshield and press against the surface outside. This pressure surface is of a piece of rubber which will not scratch the glass. Projecting on the inside of the cleaner is a knob by which the device may be moved from one side of the shield to the other, wiping off snow, rain or sleet, by a movement of the hand.

Universal Valve Grinding Tool.

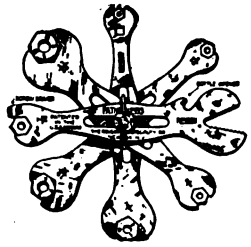
L. J. Kaiser, 146 Park boulevard, Detroit, Mich., announce a new Universal valve grinding tool which should be of interest to the repair trade. This tool is designed to be fitted in the ordinary carpenter's bit stock and has a removable head.

Battery Service.

The Universal Battery Company of 3420-24 South LaSalle Street, Chicago, is now offering a battery service which will no doubt be greeted cordially by all garage owners, service stations and supply men. Heretofore it apparently has been necessary for those in the auto repair business to deal with a dozen different makers of batteries and battery parts in order to get supplied with the hundred and one parts which battery users are constantly in need of. This necessity for dealing with so many different makers has always been a source of considerable irritation and confusion in the auto repair business.

The Universal Battery Company claim that this haphazard, unsatisfactory method is now obsolete. They state that they not only make and carry in stock complete batteries, but that they also have on hand at all times plates and parts for every battery for which there is a popular demand. They are also manufacturers of vehicle plates and parts for both pleasure cars and commercial trucks. The Universal Battery Company promise complete service in every detail; in a word—perfect service.

RONSON WRENCH
TRADE MARK REGISTERED



Eleven Tools in One

Eight Standard Open End Wrenches 1/4 in., 5/16 in., 3/8 in., 7/16 in., 1/2 in. 9/32 in., 11/16 in.;
Alligator Jaw
Bottle Opener
Screw Driver
Prest-O-Lite Key



The recent addition of a Screw Driver and Bottle Opener makes this tool absolutely complete.

Its highly nickeled finish makes it attractive in appearance as well as in utility.

For autoists, cyclists and everyone who uses light tools.

Case Hardened Tool Steel, Practically Wear Proof. Weighs only eight ounces; six inches long, half in. thick.

List Price, - - Each, One Dollar

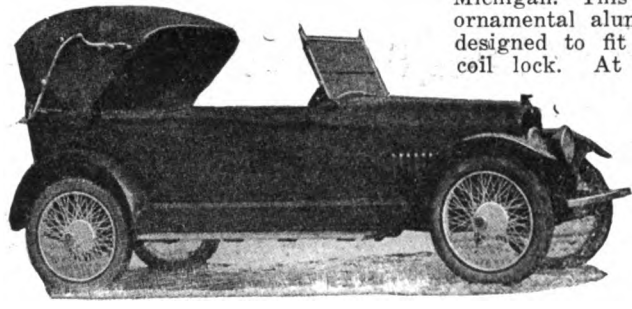
Sold by Progressive Dealers Everywhere

The Art Metal Works
Newark, N. J.

Auto Tops.

A matter of some interest along Automobile Row is the change in name of the well-known New York Auto Equipment Co., Inc., who will hereafter be known as George W. Copp Co., Inc.

Mr. George W. Copp, the president of this concern, has been identified with the automobile trade for a number of years in New York, and his company has achieved an enviable reputation among the manufacturers of automobile top and body equipment. Mr. Copp's many friends have cangratulated him upon this change, which emphasizes his personal responsibility in the product of the company.



A Victoria Top Made by Copp.

The slogan "For your top, go to Copp," is given increased significance, and the handsome Victoria top which is illustrated herewith seems to prove that the admonition is a good one.

Adamson 5-Minute Vulcanizer.

An entirely new and improved feature in portable vulcanizers is the use of powdered dry fuel for heating. This fuel is furnished with the Adamson Model E outfit for repairing tube punctures and comes in a small round box with a small measuring cup. This cup is filled with the powdered fuel and poured into the vulcanizer and burns with a hot flameless glow which is said to vulcanize the patch permanently. The 5-Minute outfit includes the vulcanizer, one can of dry fuel, a box of 12 patches, sandpaper and directions for use. The Adamson Vulcanizer is manufactured by Adamson Manufacturing Company, Cleveland, Ohio.



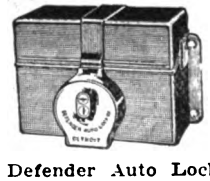
Adamson Five-Minute Vulcanizer.

Smooth-On Iron Cement.

The Smooth-On Manufacturing Company of Jersey City, New Jersey, market an iron cement for repairing leaks in water jackets, boilers, tanks, screw thread joints, flanges, etc., and it would seem that a new field has been opened for this product in the repairing of scored cylinders. Smooth-On is said to work well if the cut is deep or jagged, and it is applied by diluting it with salamoniac. The cement is applied to the score with a whittled stick and while it is still wet the piston is passed through the cylinder to remove the superfluous cement. The rings should be removed from the piston before this is done, however. After the cement has hardened, over night, the rings may be put into place and the Smooth-On cement scraped to conform with the shape of the piston.

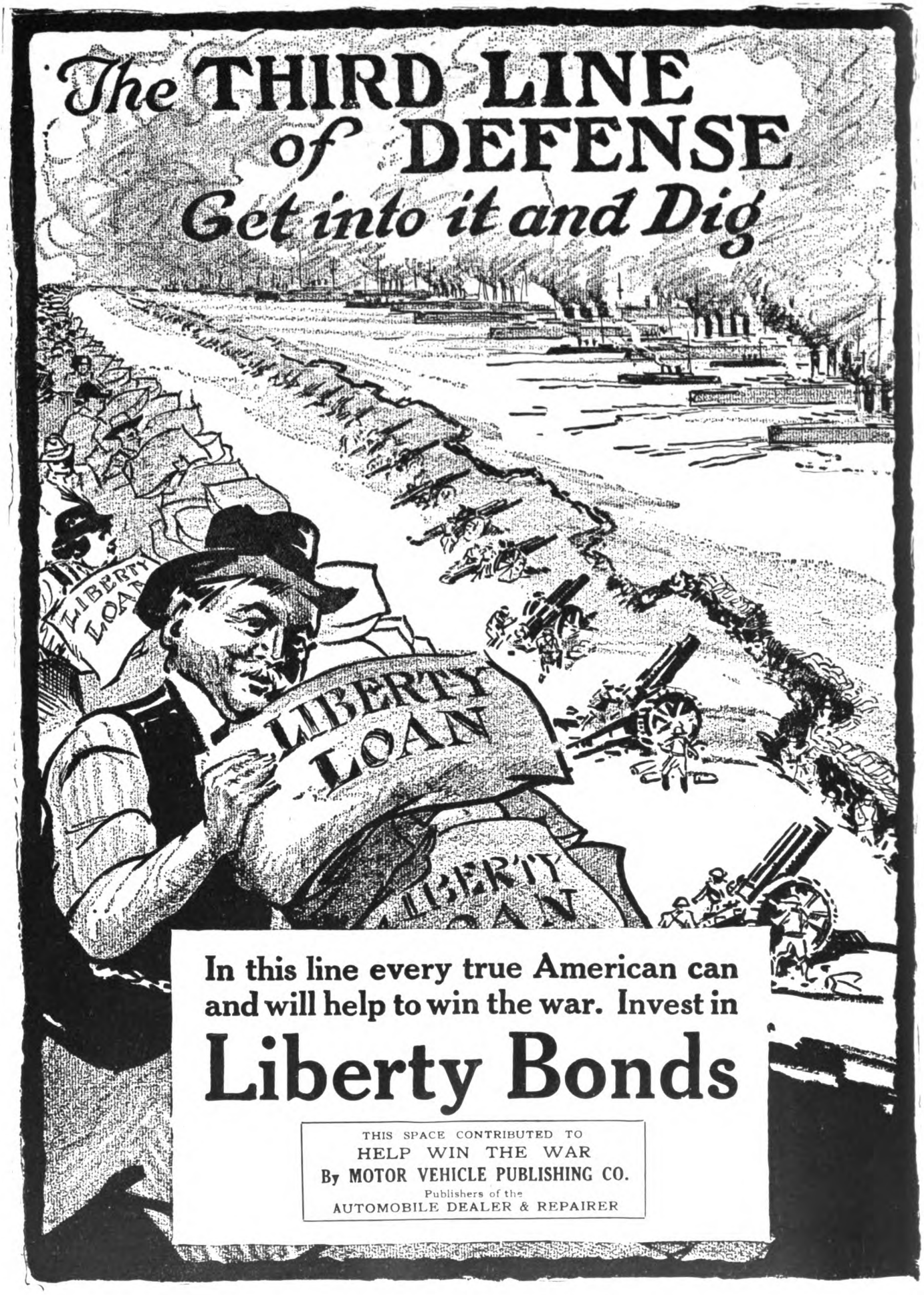
Defender Auto Lock.

An interesting device, which is said to be practically thief-proof, is manufactured by the Defender Auto Lock Company, Marquette Building, Detroit, Michigan. This lock consists of a heavy ornamental aluminum casting, which is designed to fit over the regular Ford coil lock. At the upper end of the aluminum casting is a hook through which is passed a heavy metal strip which locks the cover on the coil box. Two keyholes are provided in the lock. The first retains the cover strap, while the second controls the ignition line. An illustration of the device is reproduced herewith and is self-explanatory.



Defender Auto Lock.

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Worth Fighting For?

SHALL this little girl grow up in the sort of American home we know, healthy and happy? Shall she have the advantage of living and learning in a free land, under free institutions? Shall such children develop into Liberty-loving citizens that a free America may be proud of?

For over two hundred years Americans have fought valiantly, and died gallantly, to win for themselves and hand down to their posterity the blessings of liberty, justice, self-government and equal opportunity. This precious heritage, bought at so great a price, is now threatened.

The question which today confronts America as a nation, and you as an individual, is whether or not a free America is worth fighting for

Are American children in this and all future generations to receive unimpaired the legacy of freedom of which we are now the custodians, or shall their country be turned over bodily to the brutal, rapacious, power-mad enemy which has forced us into this war?

This question cannot be answered by word of mouth, but by deeds alone.

Let your answer be your investment in

Liberty Bonds!

THIS SPACE CONTRIBUTED TO
HELP WIN THE WAR
By MOTOR VEHICLE PUBLISHING CO.
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AUTOMOBILE DEALER & REPAIRER

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Meeting a Patriotic Need



AMBU—POST AMBU+POST

Yours is, no doubt, one of the thousands of garages which has felt the loss of one or two men—whose services were needed to help in this war for democracy—one of them just the man you depended upon to care for electric starting and lighting troubles and repairs.

If so—

NOW IS THE TIME TO BUY—

AMBU

TRADE MARK

Machines must do the work men used to do

The automobile is playing a big part in helping to relieve the transportation of the country—

The millions of cars must be kept in service—it is a patriotic duty—

And the extra demands made upon each and every car will multiply the need for repairs of all kinds—

The mechanical repairs are simple—

But the troubles with electric starting and lighting systems are baffling to find, many times even for an expert—

With your electrical repair man gone you face not only the patriotic duty of sharing the work of keeping the motor cars of the country running but the problem of having to refuse this kind of repair work—profitable and desirable if economically and thoroughly done—

AMBU—is the answer.

WHY?—Because with AMBU you can become an electrical expert.

You have all the available information regarding every system and every car at your finger tips.

You have 500 complete wiring diagrams of cars in use since 1911.

You have information telling you just how to correct every trouble on every one of those systems on every one of those cars.

AMBU—The Electrical Wizard—locates the trouble—accurately—automatically—quickly—when AMBU tells you what it is there is no further question.

You go right to the seat of the trouble—you don't tear the whole system apart guessing what or where the trouble is. You cannot afford—you might say you don't dare—to be without AMBU.

Car owners the country over are learning to seek out the AMBU shop for electric repairs.

Those shops are looked upon as a standard—up-to-date and reliable.

Thousands are using AMBU. Taking business away from the guessers—getting and holding satisfied customers—

Don't be one of the guessers.

AMBUIZE your shop now as a patriotic duty and to save your business.

American Bureau of Engineering, Inc.

Automobile Department

1025 So. Wabash Ave. Chicago, Ill.

Good Reasons Why YOU Need AMBU

Fills the place of the drafted man.

Hard to get good electrical men.

It gives in a condensed form the best expert brains of the country and an insight into the starting and lighting business that nothing else can.

It's the only positive way to locate trouble on starting and lighting equipments.

It gives a reputation as a Master Automobile Electrician.

It will bring business to your shop thru the monthly AMBU test.

AMBU will make electrical repairs easy and profitable.

ELIMINATES WASTE

Increases business.

More profit on electrical work. Increased efficiency—can work on all systems.

On three jobs a week at $2.50 per job it will return $390.00 per year, or over 300 per cent on the investment.

Saves time.

Does your thinking for you.

Eliminates guesswork.

AMBU Service Consists of:

AMBU INSTRUMENT, and the following sets of master equipment charts, with their wiring diagrams, instruction and battery books:

1. **Autolite**
2. **Delco**
3. **Gray & Davis**
4. **Remy**
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8. **Bijur, Dyneto and Entz**
9. **North East and U. S. L.**
10. **Wagner, Detroit, Ward Leonard**
11. **Leece-Neville, Robbins & Myers, Simms-Huff**
12. **Electro, Jesco, National**
13. **Adlake, Deaco, Esterline**
14. **Allis-Chal. Disco, Heinze**

Consultation service for one year from the delivery of AMBU. All additional wiring diagrams put out by us for one year from date.

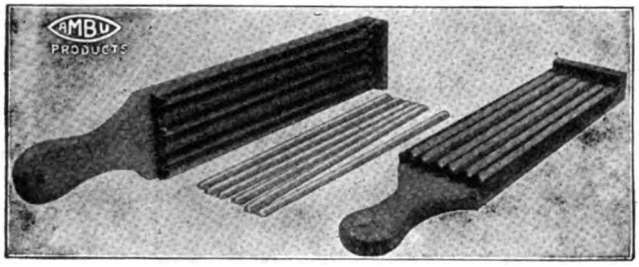
The AMBU Trouble Shooting System consists of three parts, each of which is essential, and without any one of which the System would lose much of its value. These parts are:

1. AMBU—A Combined ammeter and voltmeter which has special patented features not possessed by any other instrument that has ever been made.

2. MASTER CHARTS—Books of instructions for the location of troubles which may arise in the electrical starting and lighting systems of gasoline automobiles.

3. 500 WIRING DIAGRAMS covering the complete wiring on the car. The complete AMBU service contains information impossible for you to obtain in any other way—viz., **showing internal hidden wiring connections rarely shown by the makers themselves**—classified, systematized, readily accessible, and filed in a handsome, substantial metal case with lock—a compact authoritative service.

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AMBU BURNING LEAD MOLD
For Molding Scrap and other Lead into Molds for making Burning Lead

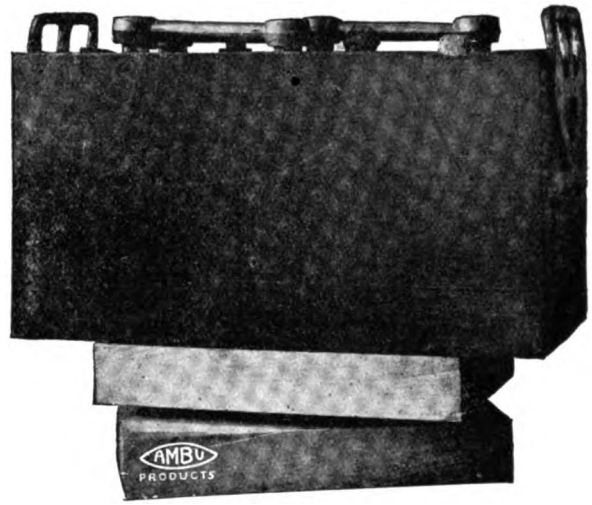
Battery Repair Appliances

AMBU

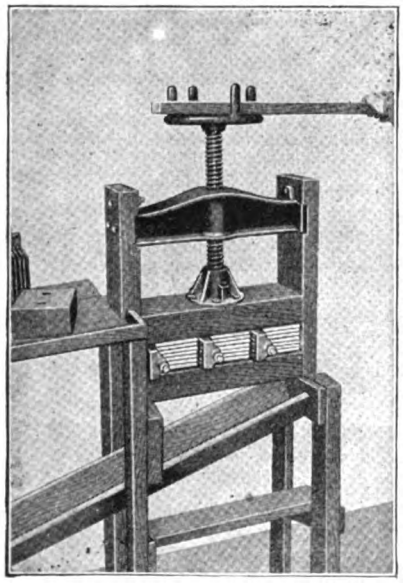
WITH these labor saving devices as a part of your shop equipment you are enabled to care for all the battery repair work in your section. These practical appliances have proven indispensable to the repair man and promise to become equally as popular as our famous AMBU **Trouble Shooter.**

Bearing the well known AMBU trade mark stamps these appliances as not only highly efficient, but they have back of them the company which has done so much for electric starting and lighting repairs through the distribution of AMBU.

There is a lot of money to be made in battery repairs, *but* the proper tools are *necessary*. AMBU BATTERY REPAIR APPLIANCES furnish the equipment necessary to do first-class work. With them you can handle all phases of this work with least expense of time and labor. *Being time and labor savers—they are money makers.*



AMBU BATTERY TURN TABLE
Saves lifting the heavy battery when making repairs



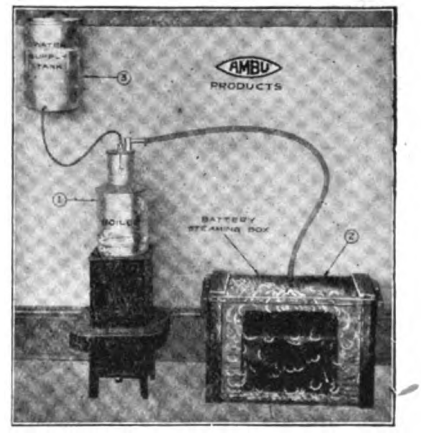
AMBU PLATE PRESS
Complete with Transite Boards

There is a crying need for each of these appliances in every shop pretending to handle Battery repairs. The cost is small compared to their money making possibilities.

Send for catalogue minutely describing each of the tools pictured herewith.

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The distribution of this original line is a valuable concession. We urge you to make your plans NOW for the demand we shall create through our advertising and salesmen.



AMBU BATTERY STEAMER
For softening sealing compound on starting and Lighting Batteries

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1025 So. Wabash Avenue, Chicago, Ill., U. S. A.

Makers of AMBU Electric Trouble Shooter

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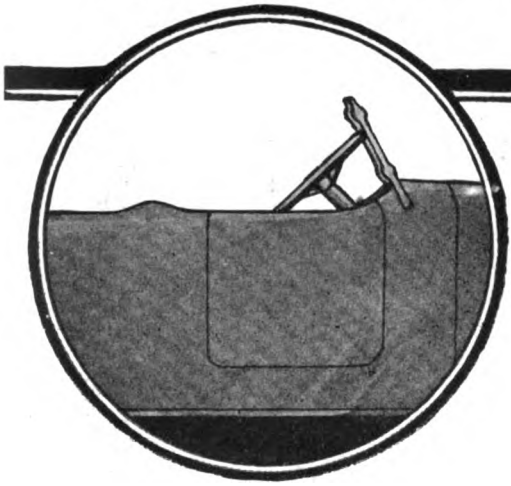
Refinish Your Car!

You Can Do It Yourself

A free Sample of PANVAR will be mailed upon receipt of 10c. in stamps to cover mailing expense.



List Price
$1.50 a quart
enough to refinish a car
$5.00 per gallon







For a Beautiful, Lustrous Lasting Finish

To apply PANVAR you don't have to be an experienced painter. PANVAR isn't a paint, but a fine, permanent high gloss lacquer finish that is self-leveling and quick drying. It leaves no brush marks, no streaks, spots or lumps.

Why drive a shoddy looking car when you yourself can give it that new fresh-from-the-factory look with a quart of PANVAR and about an hour's work? Apply it today, and your car will be ready to ride in tomorrow, looking as bright and new as the day you bought it.

PANVAR is transparent, so you can apply it to any color of body. It dries with a hard glossy finish in from 6 to 8 hours.

Use PANVAR also to preserve the finish of metal parts, prevent rust, etc. Can also be used for waterproofing leaky tops, and redressing worn leather or imitation leather upholstery.

Garagemen. Use PANVAR for refinishing your customers' cars overnight. Big profit. Every car owner a prospect. Easy to apply and quick to dry.

Jobbers and Dealers. Consider the big number of car owners whose cars will need refinishing this spring. Be prepared to meet this demand. Cash in on the advertising we are now doing and will continue to do. Write today for discounts, electrotypes for catalogues, and mailing literature. Dealers and Garagemen may order direct for delivery through their regular jobber.

THE PANVAR COMPANY

608 Bulletin Building Philadelphia, Pa.

H. A. MEYERCORD, Manager Sales

THE LASTING FINISH
Panvar
TRADE MARK

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WOODWORTH
Worth While

ON OR OFF IN A JIFFY

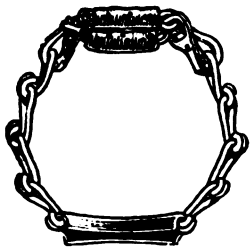
No backing up—no muss and fuss—no jack necessary to attach.

EASYON CHAINS

Grip Like Mudhooks
Ride Like Bare Tires

Throw link over tire, snap, snap—that's all! Anyone, women and children even, can put them on whether caught on slippery pavement, or in mud hole axle deep.

Small Prices
Small Bulk
Small Weight



You'll always carry Easyon Chains, because they tuck away in a small corner. And they cost you but 50% to 60% of usual prices for chains—only $3 to $5 per set!

OWNERS Ask your dealer or write us for Free Booklet.

DEALERS Get attractive agency terms.

Spring Squeaks and Breaks are Eliminated

With your springs lubricated—protected from dust, dirt, rust and water—by the

WOODWORTH SPRING COVER

They lubricate automatically a whole season without attention from you—make riding a real comfort—save squeaks—prevent dirt and rust from attacking the springs—give your springs the efficiency of shock absorbers, for a price so low as—



Make of Car	No. of Covers	Genuine Leather	Imitation Leather
Buick Little Six	8	$9.20	$4.00
Buick Little Six	8	10.40	4.80
Cadillac 8	10	15.20	7.00
Dodge	10	13.00	5.80
Ford	4	3.50	1.60
Hudson Super Six	8	12.80	6.20
Studebaker 4 or 6	10	14.20	6.60
Chandler	8	12.00	5.60
Chevrolet	4	6.00	2.80
Kissel Kar	10	13.80	6.40
Mitchell Model 42	8	12.40	5.80
Overland 85 and 86	8	11.20	5.20
Oakland 37 and 38	10	10.80	5.20
Paige	8	10.40	4.80
Reo 6	8	11.20	5.20
Saxon 6	4	7.30	3.40

SEND FOR FREE CATALOG AND PRICES

WOODWORTH MFG. CORP.

2000 WHIRLPOOL ST., NIAGARA FALLS, N. Y.

(For Canada) Niagara Falls, Ont.

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"You don't have to buy from us, but you will"

MACO
MOTOR ACCESSORIES CORPORATION

Mr. Dealer and Garageman

If you assure the Automobile owner, throughout the country, that he can purchase all of his accessories through a well-organized chain of retail stores and that he will receive uniform quality and product without substitution or delay, he will become a customer of yours.

Retail chain-store corporations, as you know, are successful in every line.

Our business is the Automobile Accessory Business and is founded upon and governed by the methods which have been successfully employed in other industrial lines. These methods protect those who become one of us and elevate the motor accessory field to a plane approaching perfection, finally resulting in satisfied dealers and consumers.

Our Policy is

ECONOMY, EFFICIENCY and BETTER SERVICE

If you want to know what is necessary to become one of us—
If you want to know what you have to do to become one of us—
If you want to know why it will pay you to become one of us—
If you want to know what we do for you when you become one of us—
If you want to know how we increase your business—
If you want to know how and why our name will become a home-word to the mororists throughout the country—
If you are the man with enough foresight to grasp an opportunity and take advantage of it when it is presented to you—

Write Us for Further Information

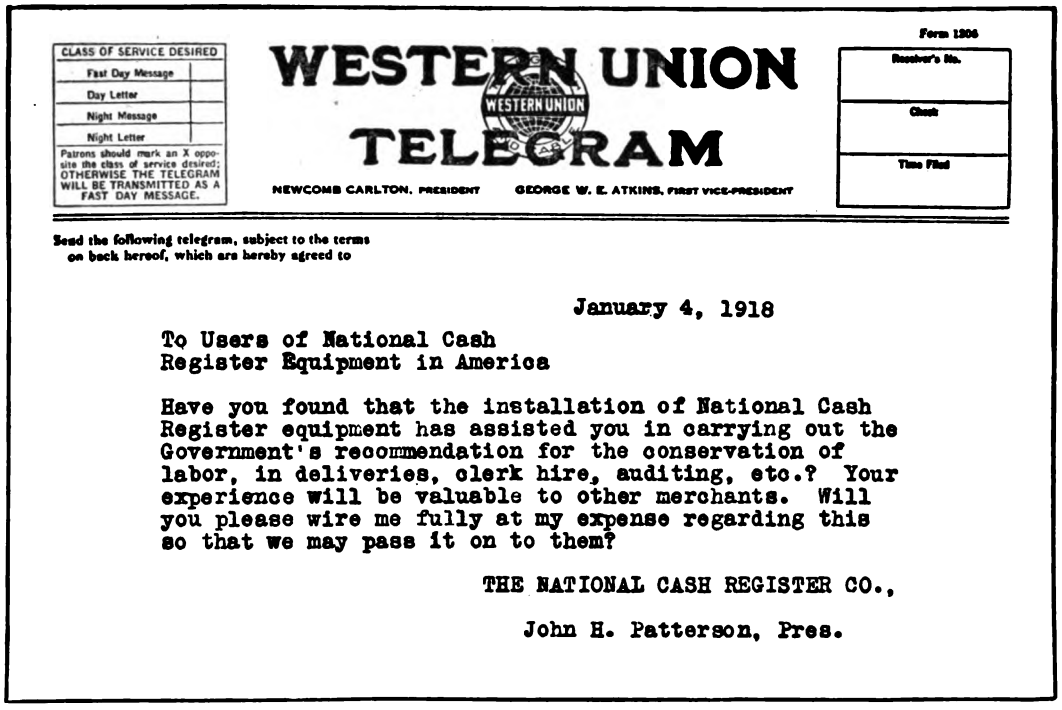
MOTOR ACCESSORIES CORPORATION

H. J. Curtis, Genl. Mgr. **170 Broadway, New York**

"You don't have to buy from us, but you will"

Please mention the Automobile Dealer and Repairer when writing to advertisers.

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CLASS OF SERVICE DESIRED
Fast Day Message
Day Letter
Night Message
Night Letter
Patrons should mark an X opposite the class of service desired; OTHERWISE THE TELEGRAM WILL BE TRANSMITTED AS A FAST DAY MESSAGE.

WESTERN UNION TELEGRAM

NEWCOMB CARLTON, PRESIDENT GEORGE W. E. ATKINS, FIRST VICE-PRESIDENT

Form 1206
Receiver's No.
Check
Time Filed

Send the following telegram, subject to the terms on back hereof, which are hereby agreed to

January 4, 1918

To Users of National Cash
Register Equipment in America

Have you found that the installation of National Cash Register equipment has assisted you in carrying out the Government's recommendation for the conservation of labor, in deliveries, clerk hire, auditing, etc.? Your experience will be valuable to other merchants. Will you please wire me fully at my expense regarding this so that we may pass it on to them?

THE NATIONAL CASH REGISTER CO.,

John H. Patterson, Pres.

What American Business Thinks of N. C. R. Service in War Time

As an aid to compliance with the Government's request for the conservation of man power and motive power, the N. C. R. System has received a striking endorsement from American business.

The following excerpts from the hundreds of replies to the above telegram are from department stores, confectioners, butchers, stationers, druggists, grocers, garagemen and many more lines of business.

"We recommend National Cash Registers to any who wish to conserve."

"Cash registers save in auditing and cashier service."

"National Cash Registers and Electric Credit System cause customers to carry packages instead of asking for delivery."

"We recommend the cash register system to every merchant who desires efficiency and economical service in his store."

"The cash register gives correct records and is a great labor saver."

"Without registers we could not handle the business with present force."

"Your cash register has been a great help in systematizing our reports and records."

"Your product is essential to the conduct of our business."

"Cash registers speed up service to customers."

For further information fill out the coupon and mail it today.

Whatever your business, the N. C. R. System will help to put it on a war-time efficiency basis.

Dept. 702 National Cash Register Company, Dayton, Ohio

Please give me full particulars regarding your up-to-date system for a Garage and Automobile Accessory Store.

Name_____

Address_____

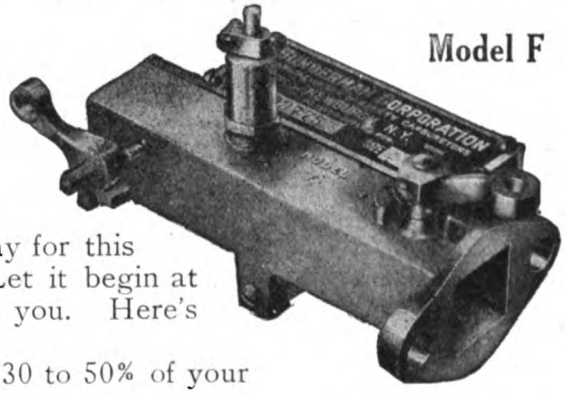
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SUNDERMAN

Vacuum Carburetor

F. O. B. Newburgh $6

For Ford, Metz and Saxon Four



Model F

Dealers: Send us a sample order now for a Sunderman Carburetor. We back you up with great advertising support, and give you a fine proposition.

SEND us an order today for this great carburetor. Let it begin at once to make good for you. Here's what it does:

Positively saves from 30 to 50% of your gasoline. **PROVE** it.

Increases mileage from 42 to 70%. **Prove** it.

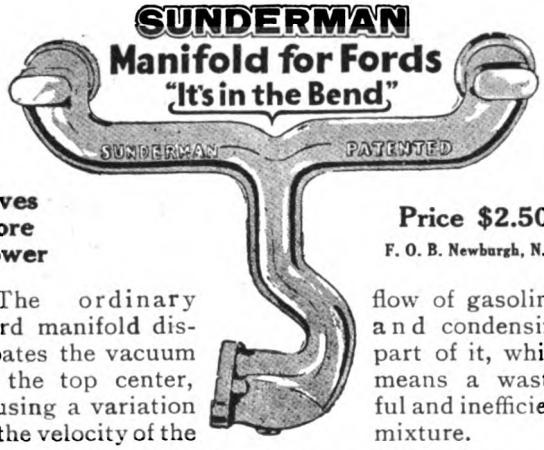
Gives more power than your car ever had. **Prove** it.

Gives greater speed, quicker pick-up, faster get-away, better hill-climbing, greater flexibility—in a word, everything you could possibly hope for in a carburetor.

Prove it—order a Sunderman today, give it a fair trial—you'll be enthusiastic over the results. You'll save the purchase price in a few days on gasoline, but send your order now.

Many thousands of Ford owners are enthusiastic boosters for this carburetor.

SUNDERMAN
Manifold for Fords
"It's in the Bend"



Gives More Power

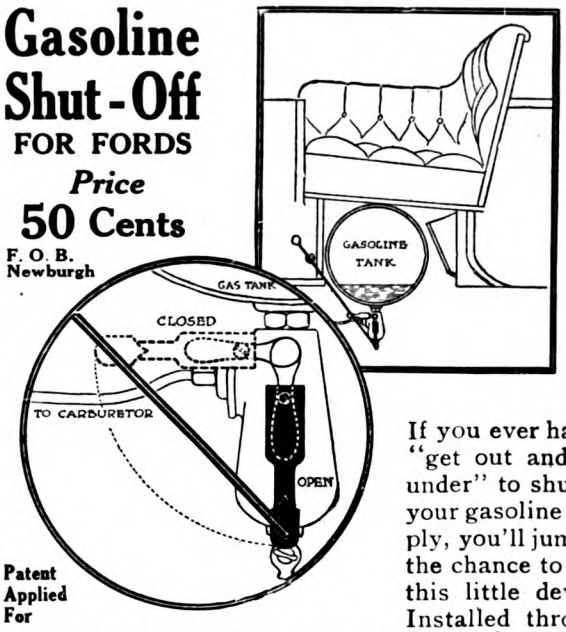
Price $2.50
F. O. B. Newburgh, N. Y.

The ordinary Ford manifold dissipates the vacuum at the top center, causing a variation in the velocity of the flow of gasoline, and condensing part of it, which means a wasteful and inefficient mixture.

Because of the "bend" in our manifold, a uniform vacuum is preserved, a constant velocity of the mixture maintained, with a resultant economy that is worth while. A pocket in the interior of the manifold near the joint catches and holds gasoline that condenses when the motor is shut off—thus furnishing a supply of quickly vaporized gasoline in the manifold that produces quick starting.

Can be used with all Ford carburetors. The *ideal* installation is with a Sunderman Carburetor. Send your order *now*. Price $2.50.

Gasoline Shut-Off
FOR FORDS
Price
50 Cents
F. O. B. Newburgh



Patent Applied For

If you ever had to "get out and get under" to shut off your gasoline supply, you'll jump at the chance to buy this little device. Installed through a small hole on the floor board—**a pull shuts off the gasoline, a push turns it on again.** A great economy, but a more wonderful convenience. Think of what you'd give for this if you had a backfire. Then send us an order today. Price 50 cents.

SUNDERMAN CORPORATION

13 Chambers St., Newburgh, N. Y.

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MEN! ENGAGE IN THIS BUSINESS OF THE TIMES

Motor Cars Are Rendering Most Useful Service to Our Country

Automobile factories, ever since the start of the war, have been taxed to the utmost to produce enough cars for use over-seas. In this country, the use of motor cars for patriotic and useful industrial service is enormous and is increasing all the time. New plans for mobilizing the force of the automobile are constantly being brought forth.

Wherever Motor Cars Are Used, Repairing Will Be Necessary

Throughout the breadth of the land the vast fleet of automobiles already produced will require repairing far beyond the present capacity of repair shops to handle.

High Prices of Tires and Necessity for Conservation Means Still More Tire Repairing

Automobile tires will be repaired more all the time—instead of new ones being bought. This means that tire repair shops, especially on the principal highways will have more work than they can take care of.

Tire Repairing a Most Useful Occupation

Auto Tire Repairing is the business of today for men under and over draft age. It enables you to help the Nation and help yourself. The Business is profitable and the work of absorbing interest to anyone with a natural inclination for mechanics.



Start a Tire Repair Business

High Price of Tires Means More Tire Repairing

Serve the need that now exists in your own locality

With This Great New-Type-F

TIP-TOP OF AKRON TI-RE-PAIR OUTFIT

BIG CAPACITY VULCANIZER

With Self-Contained Boiler

Only $180

GREATLY IMPROVED THIS YEAR—Our Type F Equipment—brought out early in 1917 and one of the greatest achievements in the building of tire repair equipment since vulcanizers were invented—has been even further improved this season. Look at the illustration and read the specifications below, and you will see at once that a big capacity vulcanizer, with self-contained boiler, having the high quality and specifications of this one throughout cannot be obtained elsewhere at the price asked for this equipment.

SPECIFICATIONS.—Equipment consists of two cavities; one 4½-5 in. and one 3½-4 in., the 3½-4 in. cavity being provided with Reducing Shell to take 2½-3 in.

Also fitted with Inside Patch Attachment, 3½-4 in., on which practically all sizes of inside work can be done.

Equipped with Self-Contained Boiler.

Set of Bead Molds, 4½-5 in., 3½-4 in., 2½-3 in., in either Quick Detachable or Straight Side furnished with each outfit.

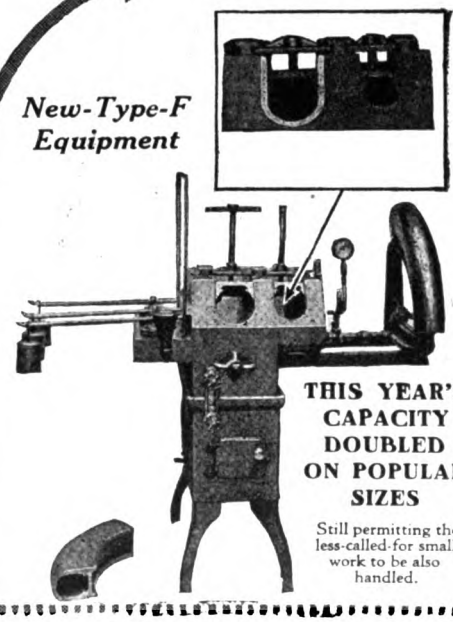
Made in one-fifth circle only.

MAIL COUPON FOR FREE BOOKLET—"Tire Repairing, The Business of the Times." It is filled with definite facts regarding the opportunities for men in the Tire Repairing Business today. Use the coupon. Be sure to mail it promptly.

WE MAKE A COMPLETE LINE OF TIRE REPAIR EQUIPMENT and are in position to furnish outfits to meet various requirements of service, output and adaptability, at prices ranging from $75 up. If interested write for complete catalog.

This year 2½-3 inch Cavity has been increased to 3½-4 inch, and provided with a Reducing Shell to take 2½-3 inch, thus permitting two popular size tires to be cured at the same time, doubling the capacity of equipment on popular sized work.

New-Type-F Equipment



THIS YEAR'S CAPACITY DOUBLED ON POPULAR SIZES

Still permitting the less-called-for small work to be also handled.

THE AKRON RUBBER MOLD & MACHINE CO.

Manufacturers of Tire Repairing and Tire Builders' Equipment

917 Sweitzer Ave. Akron, Ohio

Pacific Coast Distributors:

THE GEO. W. ENO RUBBER CO.

280 Golden Gate Ave., San Francisco 1026 S. Los Angeles St., Los Angeles

Gentlemen: Please send full particulars regarding your Ti-Re-Pair Equipment, and copy of free booklet, "Tire Repairing, the Business of the Times." A.D.&R.

NAME .....

ADDRESS .....

Please mention the Automobile Dealer and Repairer when writing to advertisers.

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Write Us About Your Experience With This Hose—and



Win One of these *Cash Prizes*

It's worth money to us to know what service TRIPLEXD is giving its users—and we're *offering* money to *find out.*

We want to know your experience—whether it's been good or bad. If you write the best letter—that is, the letter that most logically and convincingly sets forth the reasons for your preference for or prejudice against TRIPLEXD—you'll receive $50. If it's the second best letter, $25. If it's the third best letter, $10. And if it's one of a hundred next best letters, $1.

Now Note These Conditions:

Your letter will NOT be judged on literary composition. Write it your own way—murder the King's English all you want—use pen, pencil or typewriter; anything that's handy. Your letter will be judged solely on the facts and figures you present—the actual experience you've had with TRIPLEXD.

By facts and figures we mean whatever you've made a record of. When did you get the hose? What hose had you been using? Why did you change? How much have you used TRIPLEXD? If it gave trouble—what kind and when? How many gallons per day (average) has it conveyed? And so on.

First Prize	$50
Second Prize	$25
Third Prize	$10

and 100 other Prizes of $1 each

METAL HOSE & TUBING CO.
INCORPORATED
RAYMOND & TILLARY STS.
BROOKLYN, N.Y.

ADDRESS DEPT. C-3

And Note Further—This Is Important:

You don't have to praise TRIPLEXD to win the prize. If you've got a kick coming—that's the letter you should write. And if your letter is best, the prize is yours. We're after information.

To qualify for the prize it is necessary that you shall have been a TRIPLEXD user *prior* to Mar. 6th, 1918.

So get out your pencil and tell us all about it. And success to your efforts!

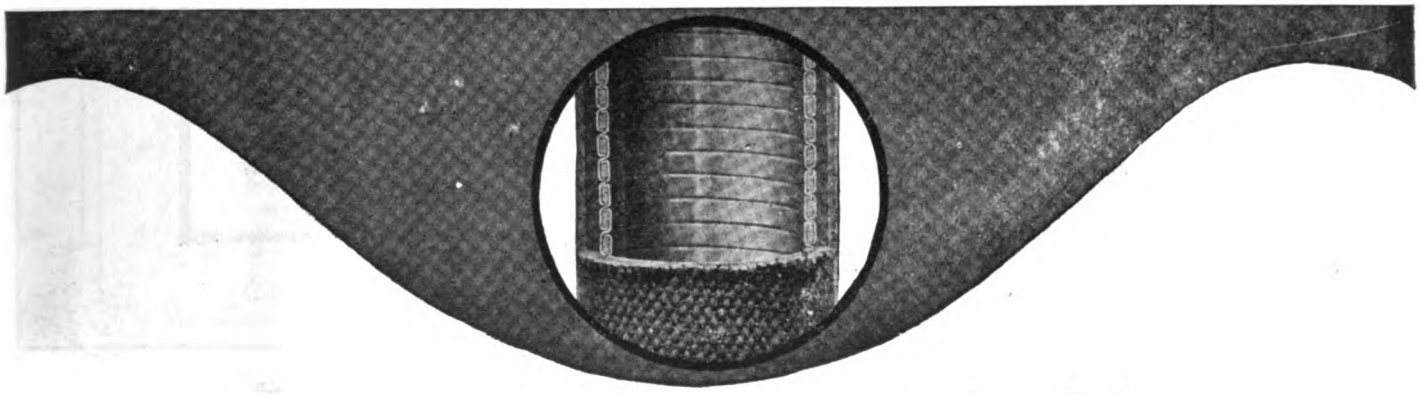
Contest closes May 1st. Prizes awarded May 15th.

Your letter will be judged by Mr. J. T. Scully, of Scully & Brandt, New York; Mr. Harvey Adams, Vice-President Auto Supply Co., New York; and Mr. J. M. Oden, President, Metal Hose & Tubing Co., Brooklyn.

In the event that two or more letters are tied for any one prize, the full amount of the prize will be awarded the writer of each such letter.

"TRIPLEXD"

GASOLINE HOSE

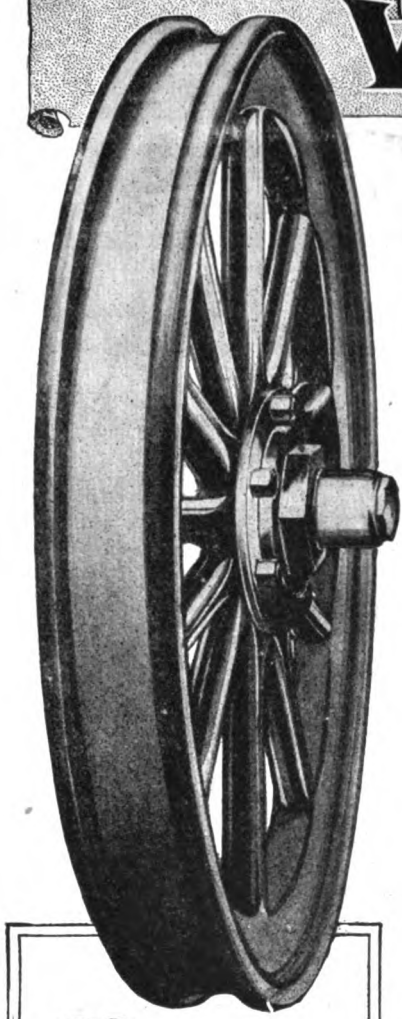


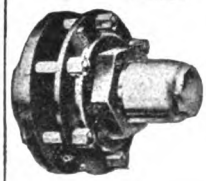
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For FORD CARS

MINUTE WHEEL

DEMOUNTABLE H-S





Equipment Extra Wheel and Flange, 4 Special Hubs and Wrench.

It's the fastest selling, most profitable Ford accessory on the market because the need for it is greatest.

A Tire Changed in 60 Seconds

After two years on the market the success of the Minute Demountable Wheel is now firmly established. It's an all year 'round seller — needed as much in the Winter as Summer. Its wonderful convenience is what sells it. Those who install it delight to demonstrate it to their friends.

Backed by strong national advertising in Saturday Evening Post, Literary Digest, Collier's, Metropolitan, Munsey's, Country Gentleman and other big mediums.

Write us for literature, prices and discounts, to Dept. K.

Retail Price, complete.....$30.00
Denver and the West.....$35.00

H-S REPAIR PARTS H-S

The extra quality of **H-S** repair parts for the Ford and Overland cars is more and more being impressed on owners' minds. They know repairs made with **H-S** parts stay repaired. You will do well to build your business in repairs on quality of parts. You will find our prices average no higher than the parts bearing no trademark.

Write for repair price list and catalogue, Dept. K.

Licensed under patents of Wire Wheel Corporation of America

HIGHEST QUALITY H-S PROMPT SERVICE

This trademark guarantees to you quality in material and workmanship — perfect fitting parts.

HILL-SMITH METAL GOODS COMPANY

MANUFACTURERS OF MOTOR PARTS AND ACCESSORIES

REPAIR PARTS FOR THE FORD AND OVERLAND CARS

BOSTON MASS.

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Make the Old Car Look Like New—

Give it a coat of

"F-S" "Evernew" Auto-Body Enamel

It works easy and dries quickly, shows no brush marks. Gives a durable surface that is bright and attractive. Eight standard shades—special shades to order.

Write for color card

FELTON, SIBLEY & CO., Inc.

Mfrs. of Colors, Paints, Varnishes since 1863

136-140 North Fourth Street - Philadelphia

"Evernew" Auto-Top Dressing revives and waterproofs old tops, yet leaves them pliable.

(18-2)

UNUSUAL OPPORTUNITY FOR INVESTMENT

is presented in a patented mechanical system which is revolutionizing old time methods of storing and distributing gasoline and other liquids. Not a stock game but a legitimate business investment for a live wire man, capable of taking active part with firm. Write Mr. W. A. Allen, 16 West 61st Street.

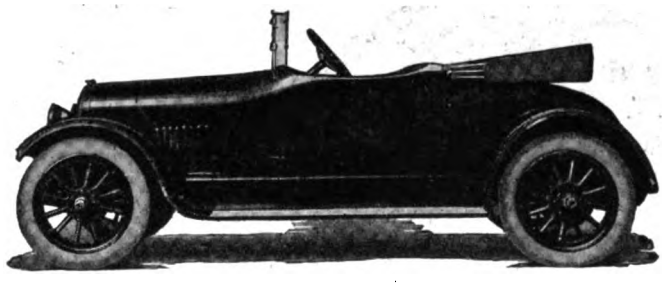
NOW

is the time to cover spare shoes, and of course you will need

The ALLEN TIRE CASE

to give the proper style and perfect protection. Made in all styles, all colors, all sizes. At dealers, or write

THE ALLEN AUTO SPECIALTY CO.
16 West 61st Street ..... New York
2007 Michigan Avenue ..... Chicago



Pilot

"THE CAR AHEAD"

COPYRIGHT 1916 PILOT MOTOR CAR COMPANY

DEALERS NOW IS THE TIME

Winter is past. Within thirty days the driving season will be on in full blast.

THE SELLING SEASON IS HERE NOW.

Even in normal times, early spring is the best time to make a new contract. You have seven full, active, money-making months in which to lay the foundations of a stable business—to carry you through the following winter.

Under present conditions the need for early action is more than ever imperative.

Those that are fortified with new or additional contracts on which deliveries are assured will reap big benefits.

Even in normal times the Pilot Six Forty-five and the Profitable Pilot Contract offer unusual advantages. In these war days they are irresistable.

Let us tell you about them.

PILOT MOTOR CAR COMPANY, Richmond, Indiana, U. S. A.

6 CYLINDER—45 H. P. 5 PASSENGER TOURING $1295.
6 CYLINDER—45 H. P. 5 PASSENGER ROADSTER $1295.

EXPORT DEPARTMENT
MARITIME BUILDING—NEW YORK CITY

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I AM PLEASING THOUSANDS
AND I CAN PLEASE YOU!



OUR **Double-Service Tire is Two Standard Make** tires bound together so that each strengthens the other—so that the two will give **More than Double** the service that either one alone could give. This joining together of **Two A-No. 1 Tires** by our process makes a tire that has **Double the Strength, Double the Fabric** and **Rubber,** and **Double** the **Thickness and Protection** for the inner tube, against the accidents and mishaps of the road, **makes it Absolutely Puncture-Proof and Cut-Proof.**

Our **Double Service** Tires are giving upwards of 6,500 miles of wear and service to Automobile Owners all over the United States, and they will give YOU that too, and with added security from punctures and cuts of all kinds.

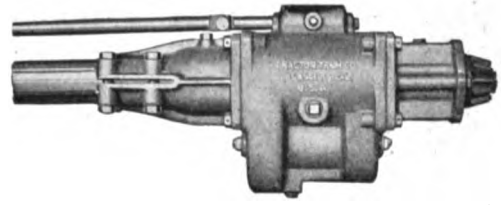
Make sure when ordering tires to state whether Q. D., Straight bead or Clincher type.

We carry a full line of New First and New Second Tires at a big saving. Write for prices, mentioning sizes. Prices upon request.

Terms: 10% Deposit, Balance C. O. D.

I. JAFFESS, Two Stores: 1319A Fifth Ave., 241 West 54th Street, **N. Y. CITY**

"MOORE"
FULL ROLLER BEARING AUXILIARY TRANSMISSION FOR FORD CARS, TRUCKS and TRACTORS



The Quality Transmission that stays Sold

Gives 4 forward and 2 reverse speeds to Fords.

On converted Ford trucks the Moore auxiliary is especially valuable for increasing road speed without sacrifice of the original power features.

A Money-Maker for Live Dealers

Easy installation. No machine work or bracing. Price $65 with attractive dealer discount. Write us today.

TRACTOR-TRAIN CO.

1347 Wall Street - - Los Angeles, Cal.



The Blacksmiths
NEED YOUR PRODUCT
Do You Want Their Trade?

Some automobile and motor accessory advertisers have been skeptical as to the importance of the blacksmith's trade.

We KNOW and can PROVE that a great majority, probably 90 per cent of the subscribers to the BLACKSMITH AND WHEELWRIGHT have taken up automobile repair work and the sale of automobile accessories and supplies.

We also know that our readers do not see the regular automobile publications at all. They are located in country towns and you cannot conveniently reach them by means of salesmen. These blacksmith shops are not large, but in the aggregate their trade is a very important one.

The way to get this trade is use display space in the BLACKSMITH AND WHEELWRIGHT.

Will you let us quote you rates and give you full particulars? If we can only get your trial order for display advertising, our medium will talk to you more eloquently than any arguments we can possibly advance.

Please let us hear from you before you forget it.

Spring is the time to get results from our magazine. Don't delay!

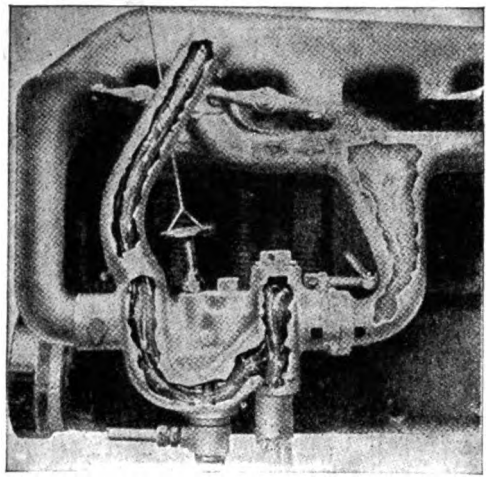
YOURS FOR A NEW FIELD

M. T. RICHARDSON COMPANY

Publishers of the Blacksmith and Wheelwright

71-73 MURRAY STREET **NEW YORK CITY**

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All Fuel Can Be Used with

Gilson Firestone Carburetor

Burns Kerosene—Distillate—Alcohol—Benzine—Naphtha—Gasoline.

Not only gasoline but all other fuels can be used successfully with Gilson Firestone Carburetor. Especially designed for Ford, Maxwell, Chevrolet, Grant and Saxon cars. Only *one* adjustment is necessary—all other parts do their work automatically.

This carburetor is creating a sensation because of the expense that it saves. If your car has a Gilson Firestone Carburetor your fuel bill is cut 50% and your mileage is increased 33%.

30 MILES PER GALLON

With a Gilson Firestone Carburetor you will get 30 miles to the gallon of kerosene. Are you getting this mileage now? As kerosene is much cheaper than gasoline you can easily figure what you will save in a year. This carburetor will pay for itself in a few weeks.

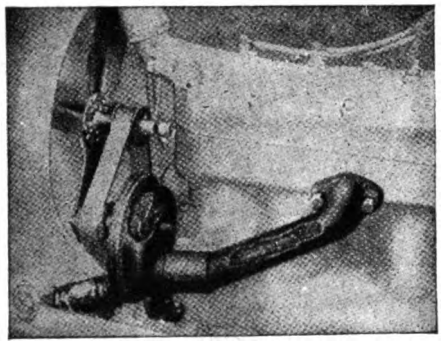
MORE POWER—MORE SPEED

With the Gilson Firestone Carburetor you will get 33% more mileage. Think what this means in saving to you. Your engine will have more power and more speed—will go up the steepest hills, through sand and mud or over rough roads. Investigate this money saver at once.

WE WANT LIVE DEALERS

The Gilson Firestone Carburetor is a whirlwind seller that is going big. Dealers everywhere are cashing in on this live proposition and are making big profits. *You* can make big money by selling them. Cable or write to us *today* for full particulars.
Retail Price F. O. B. Chicago for using kerosene including circulator, extra pipe line, complete, $30.00.
Retail Price F. O. B. Chicago for using gasoline, complete, ready to install, $18.00.

Centrifugal Water Circulation for Fords

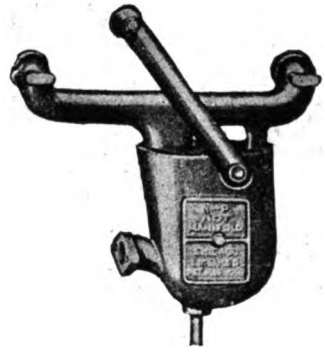


Places the Ford among the high-class cars. Keeps motor cool after several hours hard running. Saves its price in lubricating oil as a hot motor uses more oil than a cool one. Eliminates the pounding in your Ford motor when going through sand and mud, up steep hills or over rough roads. Retail Price, $9.00 F. O. B. Chicago, Ill, U. S. A.

Dealers

You better investigate this proposition at once. It means big money for you because this circulator sells on sight.

Firestone Manifold for Ford Cars

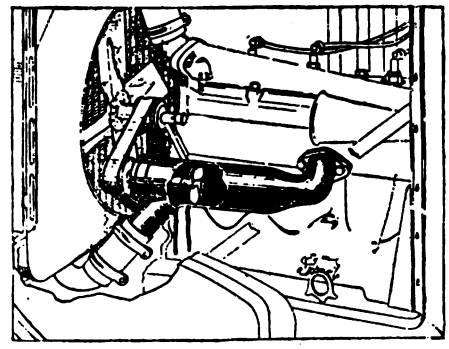


The Firestone Manifold for Ford cars keeps the heat around the inlet manifold—thus the fuel is vaporized *in* the inlet manifold. In this way, every bit of power is gotten out of the fuel and you get 15 per cent. more power. Install the Firestone Manifold and get 25 miles per gallon. Price, retail, $7.50 F. O. B. Chicago, Ill., U. S. A.

Dealers

Here's another article that is selling fast. Get the agency for this manifold and watch your profits grow.

G. P. Water Circulation for Ford Cars



The G. P. Circulator prevents the water from overheating in your Ford car. It does away with your heating problems. Keeps your motor cool and at the proper temperature at all times. This water circulator has proved itself the satisfactory one for Ford cars. Retail Price, $7.50 F. O. B. Chicago, Ill., U. S. A.

Dealers

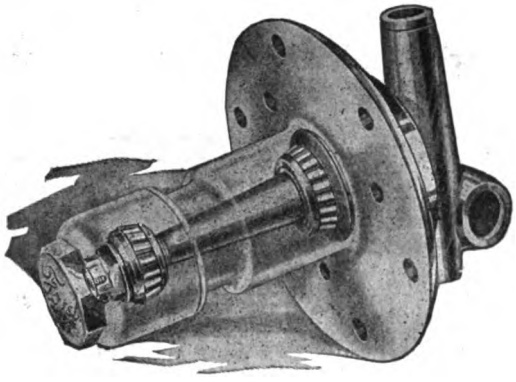
Sell this Circulator and all your customers will be satisfied with it. It sells on sight. The easiest article you ever sold.

DEALERS—All of the above products are in big demand. They are easy to sell because they are all money-savers. Live dealers everywhere are making big money with all these articles. Send us a letter or cable today.

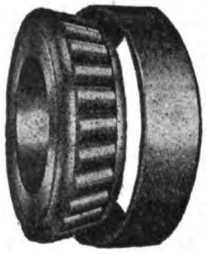
FIRESTONE SALES CO.

1806 S. Michigan Avenue **Chicago, Ill., U. S. A.**

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Wright Taper Roller Bearings on Ford Spindle



Showing Construction of Bearing. No Cage—Free Race—More Rolls. Strength and Wear Resistance at the Maximum.

Every FORD OWNER will soon ask for WRIGHT TAPER ROLLER BEARINGS

To replace the ball bearings on the front spindle.

Any repair man or dealer knows the annoyance Ford owners have from the breakage of balls in the present type of front wheel bearing. The Wright Taper Roller Bearing, which replaces the present bearing with no mechanical changes whatever, has large rolls to carry the weight and take the wear (14 in the small and 18 in the large) and thus stops front bearing trouble for all time.

THEY HAVE NO "CAGE"

Wright Taper Roller Bearings are based on a correct fundamental mechanical principle and have no cage or separating device.

Instead of this trouble-making part they have many more rolls to add strength and wear-resisting qualities to the bearing. Ford owners have been quick to see the saving and freedom from trouble gained by installing them. Once the bearing is shown the sale is easy.

Wright Taper Roller Bearings have a capacity of many times the load that the Ford can put on them, so add safety to driving. They should last as long as the car.

Dealers and repairmen, see your jobber for discounts. Car owners, see your dealer or write us for further information.

PRICE $10.00 Per Set (4 bearings)
IN CANADA $15.00

NATIONAL BEARINGS SERVICE CO.

WRIGHT TAPER ROLLER BEARINGS

Replacements for all Standard types of Bearings

727 North Broad Street **Philadelphia**

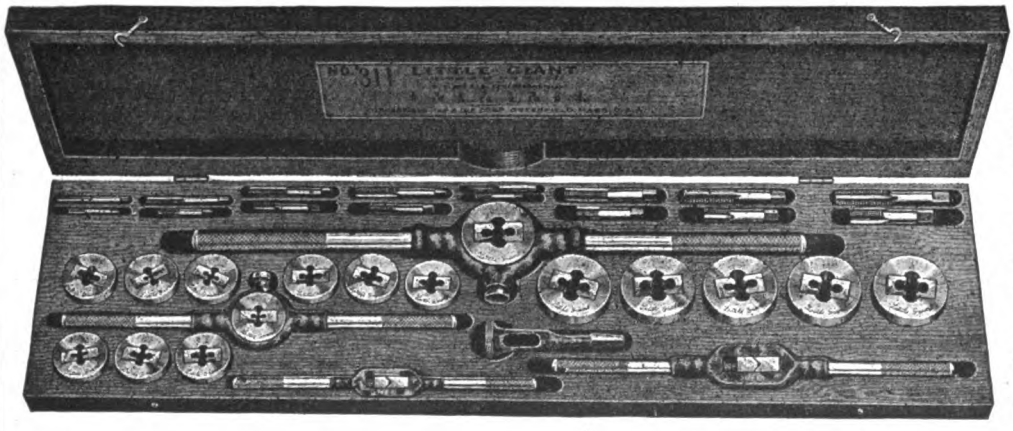
REG. U.S. PAT. OFF.

GTD

Look for the GTD trade mark when you want the best Taps and Dies

Every garage and repair shop should be equipped with "LITTLE GIANT" Combination Screw Plates. Furnished both in U. S. and S. A. E. Standards.

Each die is contained in its own collet and adjusted to size. There is also a Bit Brace Die Holder for cleaning up battered threads in out-of-the-way places.



If you are a manufacturer, garage or repair man—or car owner who makes his own repairs—you can be supplied from our big established line.

Write today for the No. 37 Catalog

Greenfield Tap & Die Corporation

Greenfield Mass.

New York.....28 Warren Street
Chicago.....13 S. Clinton Street
Canadian Factory:
Wells Brothers Co. of Canada, Ltd., Galt, Ontario.

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We Have Changed the Name

from the Any Auto Tractor to Guaranteed Tractor because the new name carries a fuller significance of our policy and the merit of our product.



Makes a Tractor of ANY Auto!

$1,519,000 Worth in 7 Weeks!

THE biggest sales success in many years. A record unprecedented in tractor history. Absolute proof that Dealers recognize the broad sales field for this remarkable machine—the only attachment that makes a Tractor of any car.

Country's Biggest Dealers Join Us

The very first announcement brought thousands of requests for territory. Every territory closed has been taken by the largest, livest, most responsible automobile and implement dealers. The very name of these dealers—the sound reputation for business judgment of their executive heads—is ample warranty for any other dealer taking on the **Guaranteed Tractor.**

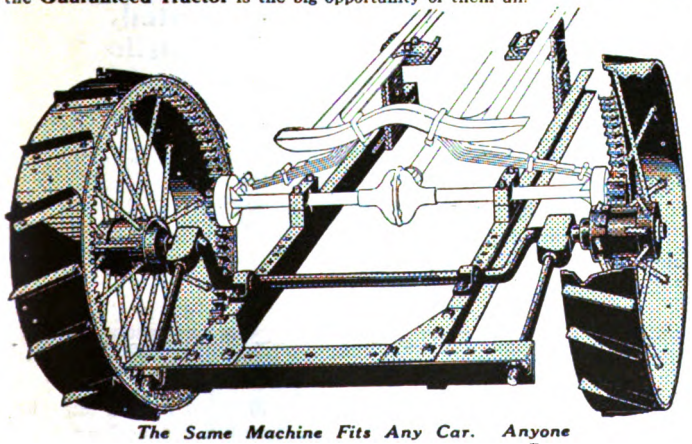
200% Larger Sales Field

The **Guaranteed Tractor** makes a powerful Tractor of **any model Ford, Dort, Overland, Chevrolet, Dodge, Buick, Studebaker, Maxwell, Reo, Velie, Saxon, Hupmobile, Oakland, Grant, Allen, Brisco and any other car.**

Its adaptability to any car gives dealers a sales field 200% larger than Ford attachments—a virgin field of 6,361,502 farms. And it is the fastest selling attachment in the Ford field, too.

"Bigger Than the Auto Industry"

LITERARY DIGEST says: "We face the dawn of an industry that will be as big or bigger than that of the automobile." "Biggest contribution to agriculture—greater than McCormick's invention of the Reaper in 1831—will work as sweeping revolution in soil tillage." The Tractor industry has arrived. With a market of 6,361,502 farms it must soon become one of America's giant industries. And the **Guaranteed Tractor** is the big opportunity of them all.



The Same Machine Fits Any Car. Anyone Can Attach or Detach it in a Very Short Time

Now a REAL Tractor!

Vital engineering improvements which positively insure efficiency in the field.

A highly developed cooling system—an air cleaner that strains the air of all dust—perfect traction in all soils—36-in. wheels with 10-in. tires—and 34 other features that make **Guaranteed Tractors** the leader.

The auto does no pulling—it is pushed ahead. The **Guaranteed Tractor** simply converts speed-power into pulling power by a gear reduction of 11 to 1. There is no strain on the engine—it starts and runs continuously on high gear.

The automobile engine as a tractor is proving itself highly efficient on thousands of farms.

4 to 8 Horse Work

If the farmer uses a small car of 20 to 25 H. P. he gets 4 horse work. With a larger car of 30 to 60 H. P. he gets 6 to 8 horse work.

He can do all farm work with **Guaranteed Tractor 69% cheaper** than with horses—one-half cheaper than standard tractors. Save $225 on every 112 acres plowed. Save $800 on every 80 acres plowed, disced and seeded. Save the wages of two men on every 80 acres plowed. Yet it costs but the price of one good horse.

New Dealer Plan—Rush Coupon

Territories are closing rapidly. The season is on. Our big sales plan makes it important that every dealership be closed immediately.

Automobile dealers must get in the tractor line to make big money.

Rush coupon or wire for territory reservation and big new dealer proposition. Learn why the foremost dealers are joining us daily.

Guaranteed Tractors, Inc.
Formerly Make-a-Tractor Corporation of America
2700-02 Michigan Avenue
CHICAGO

A.D.&R.
GUARANTEED TRACTORS, Inc.
2700-2702 Michigan Ave.
Chicago, Ill.

Gentlemen: Reserve this territory for us and send your big dealer proposition at once. We are organized to handle big sales in this territory.

We are Dealers? .....

Distributors? .....

Name .....

St. Address .....

City ..... State .....

Dealers and distributors: Rush this coupon if you do not wire. It is the second best way to make sure of your territory.

Please mention the Automobile Dealer and Repairer when writing to advertisers.

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QUICK-UNFAILING RECOIL

WITH ALL THE KICK LEFT OUT



HIGGINS

QUALITY SPRINGS

FOR REPLACEMENT

You *feel* Higgins superiority. There's spring all right—and of the *right* kind—a smooth, easy, even sway. *With* that feeling of comfort there is *also* a feeling of *safety*. Lively action tells you there's long life there. Tells you too that springs so smooth in operation *must* be superior in construction. They *are*. Nibbed together at center—that's *one* superiority.

No center hole—center bolt—center hump or center breakage. Then there's superiority in *workmanship*. Superiority in *material*. The best grade of motor car spring steel of a special analysis—properly heat treated. Leaves oiled before assembled—no squeaks. Tested for elasticity, tensile strength and anti-fatigue properties before shipping. Guaranteed alike at *all* points. Ask your dealer for them. You'll never ask for or *want* anything better.

DEALERS—We have a catalog listing more than 500 different styles—and a proposition that is unusually profitable. *Send* for them.

HIGGINS SPRING & AXLE COMPANY

DEPT. 414

RACINE, WISCONSIN

NO HOLE-NO BOLT-NO HUMP-NO JOLT

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THE NEW HLB Jr. Display Rack

Now Ready!—The *new* HLB JUNIOR Belting Display Rack

Fan Belting Sales can be greatly increased for dealers who stock HLB fan belting in this compact display rack—for the goods are out where every customer can see them. Many times motorists actually need new belts but overlook the matter because nothing is done by dealers to "refresh the memory." This new Junior display rack will serve as a constant reminder to forgetful motorists.

This rack will add to the appearance of your store. At a glance you can always see just how much stock you have on hand. With it your belting stock is in one compact form, easily handled, and well displayed. Rack is 2 ft. wide, 1 ft. deep and 2 ft. 2 in. high. Made of wood, handsomely finished and surmounted by steel sign lithographed in colors.

The HLB Junior Rack will be furnished FREE to dealers ordering the general assortment listed below. This assortment has been made up after numerous investigations, and we feel that it comprises the proper sizes and lengths of belting that you need. Use the coupon and give the name of your jobber. Do it—today!

IT'S FREE *Use This Coupon*

Here is the assortment on the JUNIOR Rack

WETPRUFE Flat Fan Belting
50 ft. roll 1-inch
50 ft. roll ¾-inch

LEATHEROUND (Round) Fan Belting
25 ft. spool 5-16-inch
25 ft. spool ⅜-inch

VEE SOL (Solid "V" Fan Belting)
50 ft. spool ⅝-inch

VEE FLEX (Laminated "V" Fan Belting)
50 ft. spool ⅝-inch
25 ft. spool ¾-inch

HIDE LEATHER & BELTING COMPANY
225 S. Meridian Street Indianapolis, U. S. A.

Hide Leather & Belting Co., Indianapolis

Please send complete information about your Junior Display Rack, together with details of your attractive proposition to dealers

_____

_____

_____

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The DEFENDER AUTO LOCK
For Fords
Discourages Thieves

Thieves take the cars it is easiest to steal—and there are enough of them standing at curbs, inadequately protected, to furnish $1,000,000 worth of booty in one moderately large American city in 1917.

The DEFENDER Auto Lock discourages thieves, because it double locks Ford cars. The tinkering and time it would require to beat a DEFENDER Lock—if, in the end, it could be beaten—would arouse so much suspicion that the thieves would never make a get-away. Thieves know this. **They pass up DEFENDER Protected Fords,** and take the cars it is easiest to steal.

It Sells for Its Five Protective Points

I
Locks and protects coil units with hardened steel band. (Patent pending.)

II
A beautiful, polished solid aluminum casing; locks over switch. (Patent pending.)

III
Operates against the ignition by special grounding device. (Patent pending.)

IV
Guaranteed for the entire life of car, and backed by a company fulfilling every sound business principle to the last ditch.

V
Recognized and used as a standard of perfection by insurance underwriters and saves 15% on insurance.

DEALERS—Write for free illustrated literature and complete details.
DEFENDER Auto Lock goes big.

Price, Complete, Only

$4.00

The Double Lock That Locks the Box and Locks the Casing Covering the Switch.

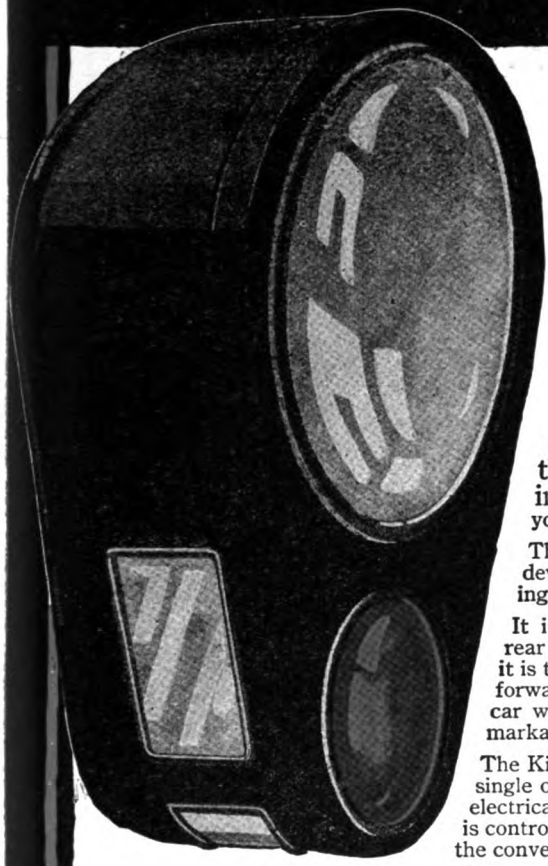
PATENT APPLIED FOR



DEFENDER AUTO LOCK CO.
506-8 Marquette Bldg. Detroit, Michigan

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SAVED!



Look at the Story the Camera Tells

Make Your Car Safe When You Back Up at Night

KING-BULL MANUFACTURING CO. KING Safety Tail Light CHICAGO ILLINOIS

Mail Check or Money Order with Coupon

$6.00

f. o. b. Chicago

$6.50 West of Colo. $9.00 Canada

Motorists, you need the King Safety Tail Light. It is the *best* and *cheapest* insurance against accident when backing at night that any motorist can buy. With it, on your car, you have a light as clear as day back of your car when you back at night.

The King Safety Tail Light was developed as a result of a car backing over an embankment at night.

It is just as necessary to light the rear of the road when backing up as it is to have headlights on when going forward. You should not drive your car without equipping it with this remarkable Safety Tail Light.

The King Safety Tail Light replaces any single or double contact tail light that is electrically controlled. The search light is controlled from a switch located to suit the convenience of the driver and the regular tail light are in one compact lamp.

Search light can be turned on or off at will. Search light throws a clear white light 50 feet back of car and the full width of the widest road. Two bulbs, one for the search light and one for the regular tail light are furnished; also a bracket to fit any car and an independent switch.

Lamp is durably made of cold rolled steel, neatly finished in baked-on black enamel.

Protect yourself, family and car now by buying the King Safety Tail Light. *It is guaranteed to give satisfaction.*

Dealers and Jobbers: Wire or write today for full particulars. *Do not delay a minute.*

King-Bull Manufacturing Company
123 East Ontario Street Chicago, Illinois



Mail Coupon NOW

A D &R.

King-Bull Mfg. Co.,
123 East Ontario Street, Chicago, Ill.
Enclosed find check for.....King Safety Tail Lights.

Name.....
Car.....
Street.....
City.....
State.....

I am a dealer Please send me dealer proposition.

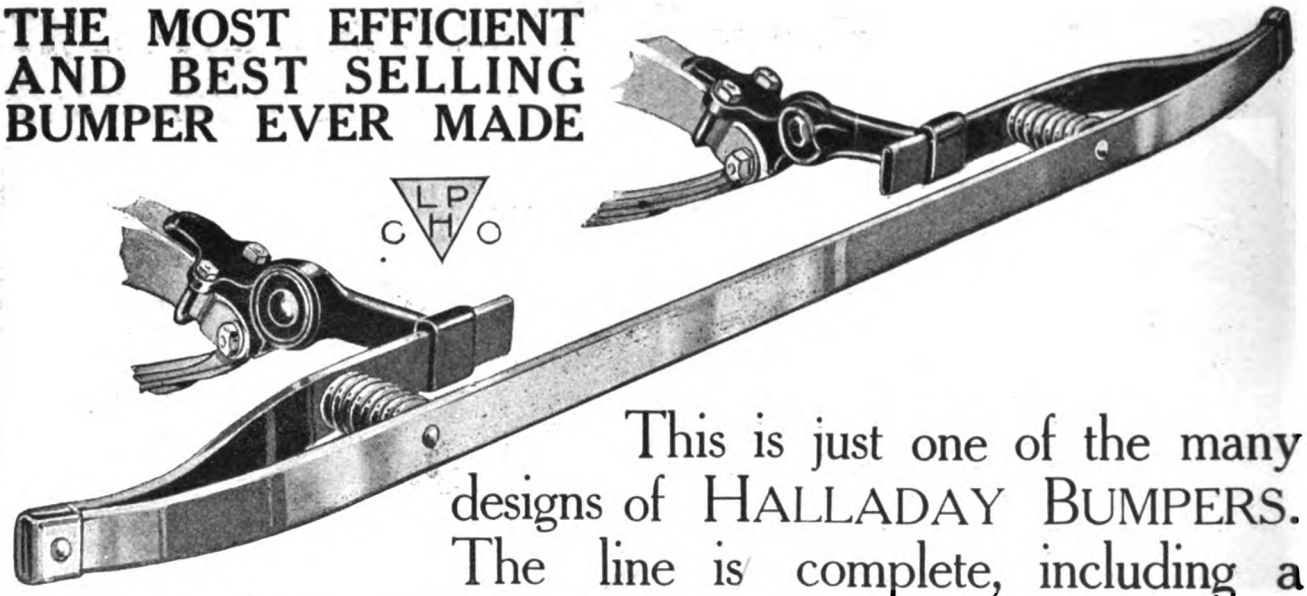
Name.....
Street.....
City.....State.....

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HALLADAY BUMPERS

MULTIPLE SPRING BAR

THE MOST EFFICIENT AND BEST SELLING BUMPER EVER MADE



This is just one of the many designs of HALLADAY BUMPERS. The line is complete, including a bumper for front and rear of every car.

The HALLADAY LINE OF ACCESSORIES includes
SHOCK ABSORBERS, TIRE CARRIERS,
TILTING STEERING WHEELS,
HALLADAY CAN TIPPERS
AND OTHER PRACTICAL NECESSITIES.

THE DEALER WHO CARRIES THE HALLADAY LINE IS RIGHT IN PRICE, QUALITY AND PROFIT.

SOLD THROUGH REGULAR CHANNELS

Write for complete catalog.

L. P. HALLADAY Company.

STREATOR - - - - - - ILLINOIS

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INLAND 1 PIECE PISTON RING

We are giving motorists *overwhelming* proof of the economy of equipping their cars with gas-tight piston rings; and of the *double* saving that Inlands offer.

Come in on this

There's a big harvest of overhauling business for every garage that will *tie up* with the Inland ring and Inland advertising. If you don't yet handle Inlands, get our business-winning proposition—including our *complete free material* for your local use that will bring you the auto work of your vicinity. Act *now*—write us today.

Ask your jobber for terms on Inlands

Inland Machine Works
802 Mound Street, St. Louis, U. S. A.

Do you know that over *two* million autos need new piston rings now?

Do you know that we are running half pages and full pages in

The Saturday Evening Post
Literary Digest
Collier's

—spending thousands of dollars to convince *all* these car owners that they ought to install new piston rings *at once*?

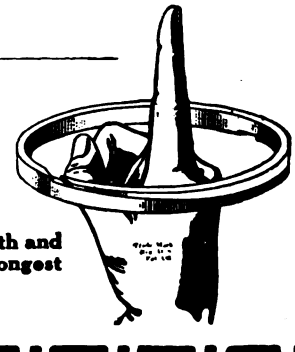
Inland Machine Works,
802 Mound Street, St. Louis, U. S. A.

Please send me your business-getting proposition, terms and full information.

Name _____

_____

Address _____



The Spiral Cut makes the Inland absolutely gas-tight. One-piece construction makes it low-priced. Equal width and thickness makes it strongest and most durable.

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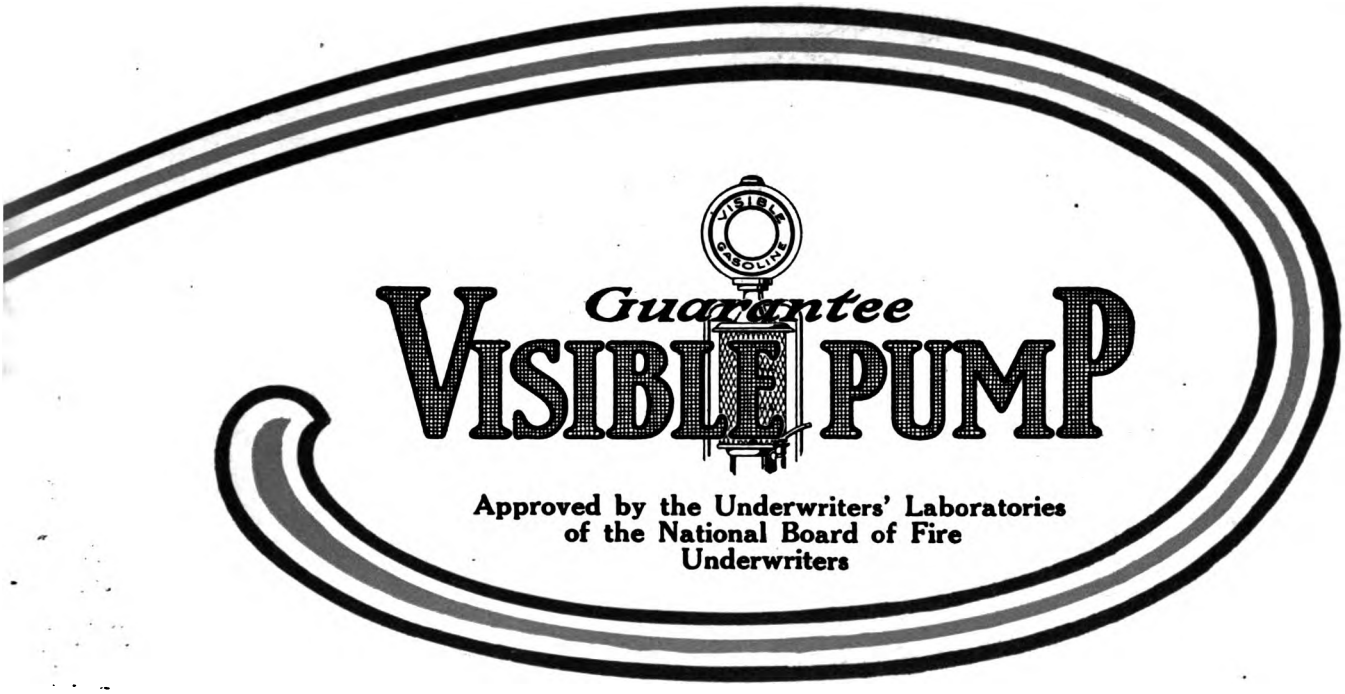
You See What You're Selling



He Knows What He Buys

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Serve and Save Your Gasoline Trade



Car owners now keep an eye on costs for upkeep and go where they get most for the money. With the VISIBLE pump, they see the gas actually measured in a GLASS reservoir. Imagine how this great feature will bring customers to YOUR door. Why—there's nothing to it. Dealers everywhere are adopting this pump because it so rapidly increases their profits and sales.

Handles any grade of gas. Zero weather does not affect it. Very simple. No adjustments. Perfect filter. Easily cleaned. Pumps one or more grades of gas. No fuel above ground.

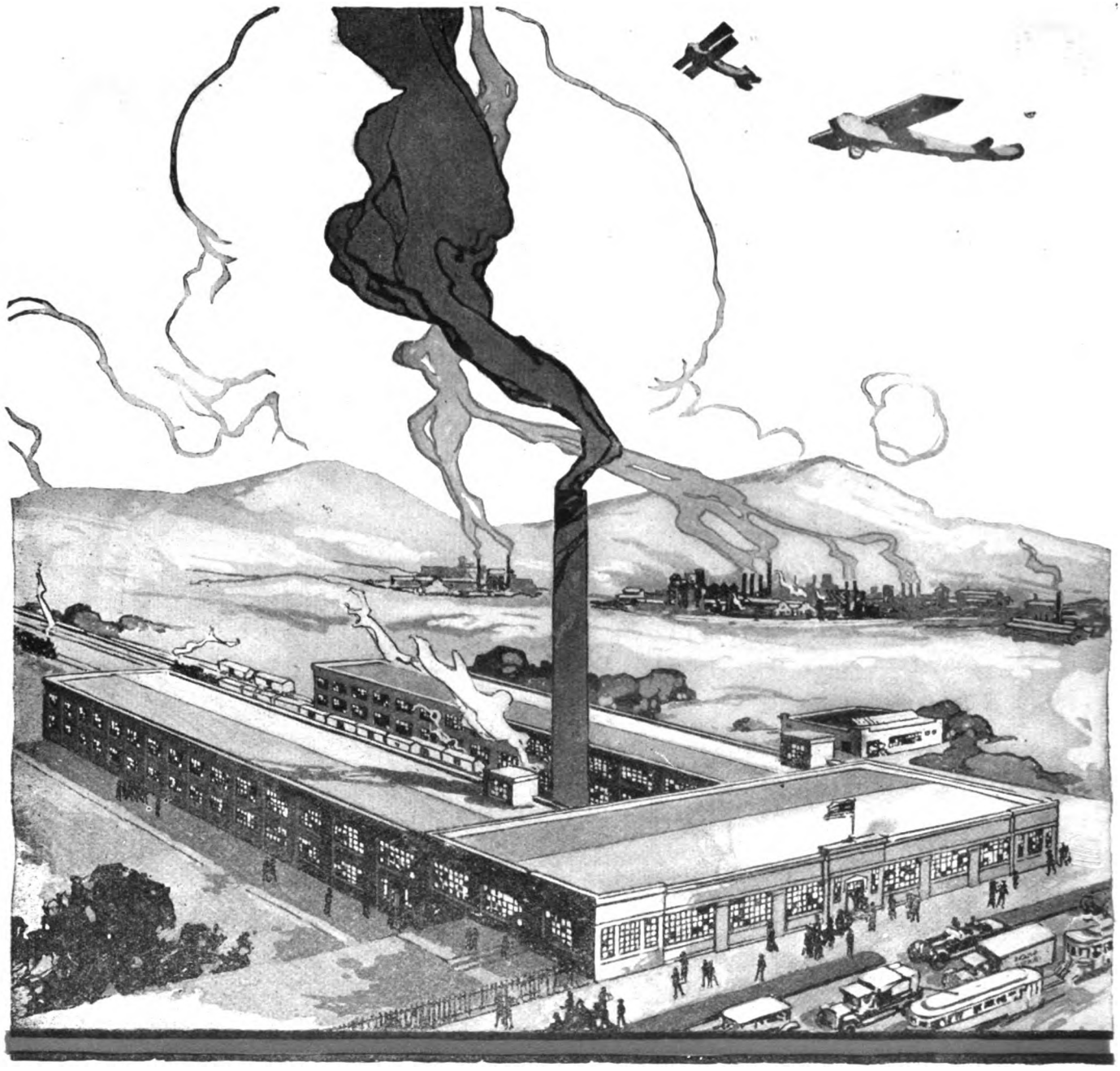
Write today. Let us send full particulars regarding this big business builder.

HEPBURN WALKER, DISTRIBUTOR

Guarantee Liquid Measure Company

Farmers Bank Building **Pittsburgh, Pa.**

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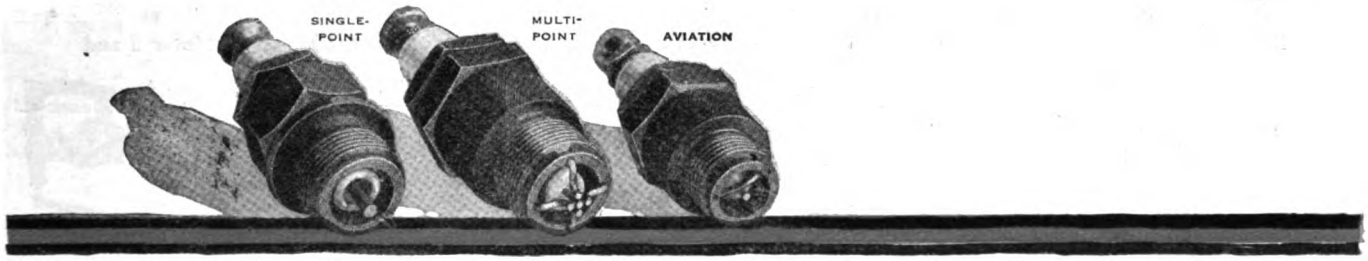
Seventy-five thousand spark plugs every working day. This is the production capacity of the Silvex Company's new plant, situated at South Bethlehem, Pennsylvania. Stretching out over thirteen acres, this new factory building, fully equipped with the latest approved machinery, testifies to the progressiveness of the Silvex Company's sales and manufacturing organization.

Bethlehem

Digitized by Google



A New Plant to Help Production Keep Pace with Demand



And it is visible proof of their ability to make good their promise "to deliver on time." Most important of all, it bears witness to the substantial quality of Bethlehem Spark Plugs and their ready acceptance by America's motoring public. And consumer acceptance—the basis for the successful merchandizing of any article of manufacture—demands *first* that the quality shall be right.

The Silvex Company, BETHLEHEM PRODUCTS, Bethlehem, Pa., E. H. Schwab, *Pres.*

Spark Plugs

Please mention the Automobile Dealer and Repairer when writing to advertisers.

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GARAGEMEN and REPAIRMEN!

Your Jobber Handles These Shop Tools

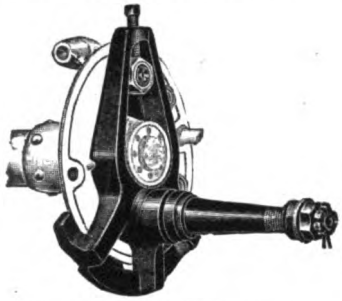
Every Up-to-Date Garage Should Have This Equipment—*Order Now.*

TRADE **EKERN** MARK

Indispensable to Garages and Machine Shops, Quick, Saves Time and Money.

You Need Them Badly — Then Insist on Getting Them

EMERGENCY AXLE STUBS FOR FORD CARS AND OTHER CARS



Emergency Axle No. 1



Emergency Axle No. 2

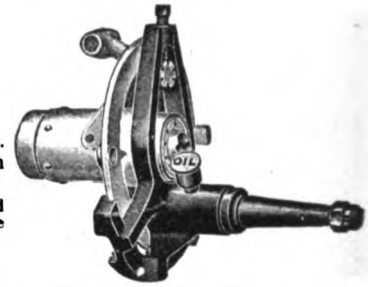
These devices are for bringing in cars with broken axles. With either type of axle, a car can be placed on its own wheels within a few minutes time.

The No. 1 and No. 2 axles require an extra front Ford wheel and cones, while the No. 3 uses the rear wheel and has a compression grease cup to prevent it from getting hot.

Nos. 1 and 3 are for Ford Cars.

No. 2 is for all other makes of cars.

List Prices: No. 1, $5.00; No. 2, $10.00; No. 3, $6.00



Emergency Axle No. 3



Portable Work Bench

PORTABLE WORK BENCH & ENGINE STAND

It is provided with two large trays, 22x24, for convenience, where the workman can place his tools, motor, and axle parts. The stand is mounted on three 4-inch diameter wheels. The rear castor wheel is so constructed that by pulling the plunger jim, the castor will swing up off of the floor and the stand will then rest firmly on its legs. By kicking the castor lever down, the stand will go back on its wheels and lock automatically.

A Ford assembly can by fastened to the stand the same as with our Motor Stand.

The Work Bench is also equipped with a machinist's vise, which has a 3-inch jaw with a 4-inch opening, which will handle any work required in overhauling a Ford motor or axle, also other kinds of work.

The Work Bench & Engine Stand is 36 inches high, 27x42 inches floor space.

Weight, 120 lbs. **List Price, $40.00**

MOTOR STAND

The handiest device of its kind for use in shops and garages doing Ford engine work. The Ford motor when taken from a car can be fastened to the stand by the two cap screws which screw into the side of the motor where water inlet connection is fastened. The stand is so constructed that the part screwed to the motor will revolve in the clamp on the stand and can be locked by tightening the lock-screw which will hold the motor in any position or angle desired to suit the workman. It also has a tool tray where the workman can place his wrenches or parts of the motor, if so desired. It is mounted on wheels so it can be moved from place to place. It is 34 inches high; 32x30 inches floor space.

Weight, 50 pounds.

List Price, $20.00



Motor Stand



Axle Attachment

AXLE ATTACHMENT

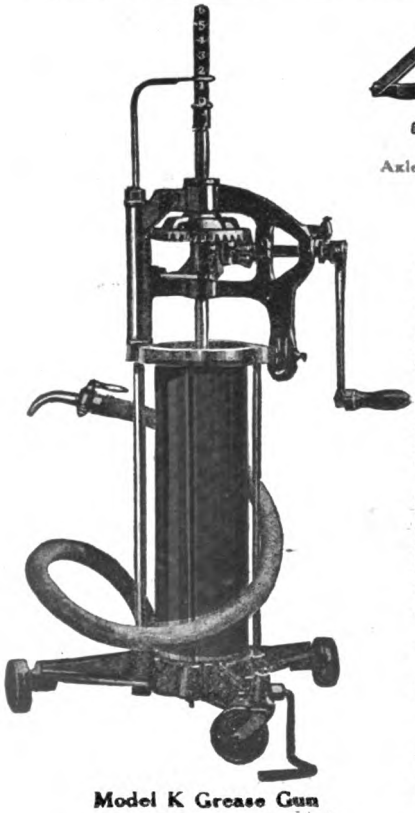
The attachment is for use on either our Portable Work Bench & Engine Stand or our Motor Stand.

By merely bolting this Attachment to the revolving part of the stands, it quickly converts them into axle repairing stands for repairing nearly all makes of automobile axles.

Weight, 9 pounds. **List Price, $6.00**



Axle Attachment



Model K Grease Gun

PORTABLE GARAGE GREASE GUN

Consists of a heavy seamless steel cylinder mounted on wheels, has five feet of hose attached to bottom of cylinder, with shut-off valve and nozzle at end of hose.

Register measures accurately the amount of grease put in the gear case or differential, and will work equally as well on liquid oil as on hard grease.

It is equipped with two sets of gears. When the crank is pushed in, it disengages the low gear and immediately engages the high gear which operates the piston either up or down at a high speed. To shift back into low speed, merely pull plunger and pull crank outward which engages the low speed gears.

The cylinder is 20 inches long by 6 inches in diameter, capacity 20 pounds of grease or 2½ gallons oil. The piston is covered with best quality cup shaped leather and is provided with an expansion ring in piston which prevents any grease or oil from leaking by. The piston also has an automatic air vent which releases the vacuum in the cylinder when cranking the piston up for refilling. The base is provided with a step-lock which lifts the castor up off of the floor and sets the gun rigidly while cranking.

To operate: Pull plunger and push crank in which engages quick return gears, turn crank to left until piston comes up out of cylinder, then pull plunger and swing head over to one side. Fill the cylinder with grease or oil, swing head back over cylinder, turn crank to right while high speed gears are engaged until piston reaches the grease in cylinder. Then pull plunger over crank shaft, pull crank outward, which will engage low speed gears, then set register by pushing down indicator to zero, then turn crank until you have the amount of grease desired. The register will show the exact amount of grease put in the gear case. The register can be reset at any time desired by pushing the indicator rod down to zero. When grease is used it registers in pounds and when oil is used it registers in pints. The same register is used for grease and oil.

Model K provided with a set of quick return gears and can be refilled in one minute.

Weight, 100 pounds. **List Price, $47.50**

PRICES F. O. B. CHICAGO — *DISCOUNTS TO DEALERS*



Open for Refilling

H. G. Ekern

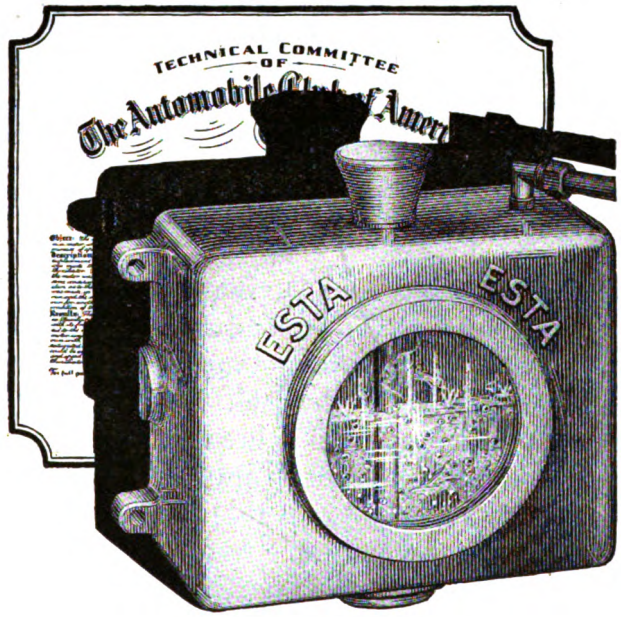
Department M

1410-12-14 So. Michigan Boulevard

CHICAGO, ILL.

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ANNOUNCING THE ESTA WATER AUXILIATOR



An Accessory that eliminates carbon by preventing its formation, giving *more power, more speed, and using less gasoline*

TESTED AT

THE AUTOMOBILE CLUB OF AMERICA
THE PRATT INSTITUTE OF BROOKLYN

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WHAT

WHEN an automobile comes from factory, its motor is clean. It develops, after a few hundred miles, the fullest power. From that point on, it develops carbon.

There are only two ways of overcoming this difficulty. One is to take the engine down at regular intervals and either scrape the carbon out of the cylinders by hand, or burn it out with oxygen. The other is to install an Esta Water Auxiliator so that the carbon may never accumulate — to burn it out *as it is forming*.

HOW

THE Esta Water Auxiliator—a handsome, polished, cast aluminum tank that goes under the hood on the back of the dash of any passenger car, truck or tractor—introduces a cleaning element of oxygen in the form of damp air. It carries this oxygen into the explosive charge that is entering the cylinder—ensuring the absolute combustion of every particle of fuel and burning the carbon as it is being deposited. It cleans a dirty motor—and keeps a clean one clean. It means the economy of greater speed and more power and less fuel.

WHY

THE principle of the Esta Water Auxiliator is old as the hills. It is the very same principle that makes the fireman turn a hose on his coal to prevent the formation of soot (carbon) in the flues. And the new Esta application of this principle is as simple as the principle itself.

It works as naturally as a human being breathes. Just as oxygen burns up impurities in the lungs, so does it burn up impurities in a motor—while combining with the gasolene vapor to give the necessary heat for the expansion of the gases and the driving of the engine. Gasolene is a light hydro-carbon. Lubricating oil is a heavy hydro-carbon. The Esta Water Auxiliator introduces an additional element of oxygen in sufficient quantity to increase the strength of the explosive charge and to burn the carbon element, which is otherwise left isolated.

QUOTATION FROM THE CERTIFICATE

OF THE AUTOMOBILE CLUB OF AMERICA

"AS regards the removal of the carbon from the cylinders of an engine, the saturated air made the carbon to form in flakes which did not adhere tightly to the walls of the cylinders and piston heads and therefore could be easily carried away through the exhaust along with the gases."

"A motor, the cylinders of which are full of carbon, will lose power and speed as well as require a greater amont of fuel consumption over that of a clean one, but this loss can be regained with the use of the Auxiliator so that the speed, horse power and fuel consumption will be the same as that of a clean motor."

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THE Esta Water Auxiliator is a new accessory well calculated to meet a new national condition. People are talking and practicing economy and efficiency as never before. The Esta Water Auxiliator gives economy and efficiency to motoring as never before. It is an economy in perfect tune with the times.

More than that, it is an accessory capable of multiplying a smaller profit many times over to help offset the absent profits from the sale of new cars, which the manufacturers are not producing at the factories.

It can enable an organization—in this period of new adjustment—to show a profit on its sales force, to hold that force together, and to look about and come in contact with the owners of every make of car.

The Esta Water Auxiliator is an accessory which people are in the mood to buy and to talk about to others. Every installation means an advertisement for you which is limited only by the driving radius of the car equipped.

We are now working out our plan for distribution. Quick action on your part practically means that every single car owner in your territory is a prospect. To become known *now* as the Esta dealer in your district means cashing in to the full on 20,000 dollars worth of consumer advertising in the Saturday Evening Post this spring.

Write to us today for profits. The next page makes it easy for you.

How Automobile Dealers can MAKE MORE MONEY

"A shortage in new cars and an increase in the use of used cars means that there is a large proportion of vehicles in use which will need new equipment. A large percentage of these cars may need a thorough overhauling—work for the repair department. Some may have been made in the era of high grade gasolene, and will require an adjustment enabling them to digest modern fuels—work for your equipment department. All will probably need accessories or attachments of some kind—work for your accessory department.

"In fact, the increased demand for tires and all kinds of accessories needed to bring a used car up to date, or to keep it in running condition, should induce you to increase the business for your supply department to the point where it will show as great a profit as was the case with your passenger car department. Keep on the lookout for new accessories. Add each one to your stock as you feel it will meet the requirements of the motorists in your territory and then *sell* it. Select only those which actually add to the efficiency of car operation, or to its utility. In other words, be able to prove to the owner that every accessory which you handle will pay for itself in a short time, either through its actual saving in cost of operation, or through the increased comfort and safety afforded the car or its occupants.

"Just as this war is showing the world at large the strength and stability of the automobile industry, so should present-day conditions be made to demonstrate the business ability of that great backbone of the industry, the dealer organization."

Excerpt from an article by H. W. SLAUSON, M. E., Editor Leslie's Motor Department

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May 18
Saturday Evening Post

June 1
Saturday Evening Post

June 15
Saturday Evening Post



COUPON

THE ESTA COMPANY
103-107 Massachusetts Avenue, Boston

I am interested in the Esta Water Auxiliator and further information about your dealer proposition.

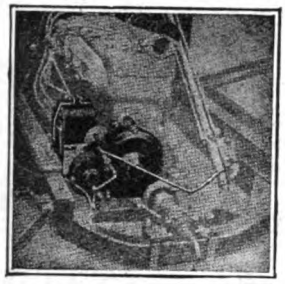
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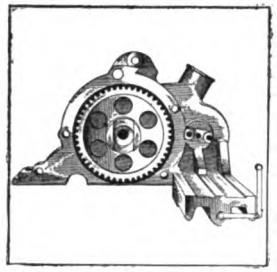
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EVOLUTION IN FORD IGNITION





"HIGH TENSION MAGNETO ATTACHMENT FOR FORD"

With this attachment you can install on a Ford any standard make of High Tension Magneto such as Bosch, Splitdorf, Eiseman or Sims.

A High Tension Magneto

Will increase power and hill climbing ability, increase speed —and flexibility—quick pick up, fast get away—increase fuel economy. Saves its cost in gas in one season. Positively will relieve all ignition troubles.

The attachment is simple in construction

Can be installed in one hour by a novice. We also supply guaranteed High Tension Magnetos and parts of the above makes, including switch, cable—at rock bottom prices.

Attachment complete (Magneto base, gear housing, gears, spark advance rod, with all bolts and screws ready for installing).

LIST PRICE $25.00

Write at once for information regarding this money maker. Liberal discounts to the trade.

MAGNETO PARTS COMPANY

1790 Broadway - - - New York, N. Y.

battery trouble?



Your generator may not be working right, starving the battery. You may be doing it great harm by overcharging it. You may have a loose connection, or a partial short circuit. When you have it recharged, you may be paying for a full charge and only getting half or a quarter charge. You can *be sure* about these things when you have a

"WORKRITE"

COMBINATION OUTFIT

The glass jar is a safe and handy receptacle for both the hydrometer and distilled or pure rain water for refilling the battery. To test the battery, draw up a little acid in the hydrometer, and the inside float tells you exactly how much it is charged. Anyone can easily test and refill their battery with the Workrite Hydrometer. By giving the battery proper attention you will double its efficiency. The Workrite Combination Outfit is recommended by all leading battery manufacturers. If your dealer does not carry this outfit, we will send it direct by MAIL PREPAID. Money back if not satisfied.

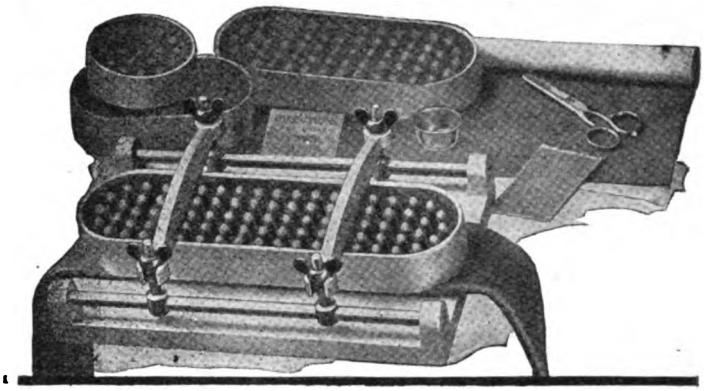


Workrite Combination Outfit, $1.50

Workrite Hydrometer Only, 1.00

THE WORKRITE MFG. CO.,

5612 Euclid Avenue, CLEVELAND, OHIO



Do Tube Repairing

This Model S-1 Adamson is designed especially for repairing inner tubes, and will vulcanize a patch up to 12 inches in length. Uses common gasoline—no steam or electricity, no waiting—always ready for instant use.

It works automatically—needs no watching or personal attention. Anyone can operate it in his odd moments, and make quick, sure and lasting repairs in a few minutes time—at the lowest possible cost.

ONLY $12.00 COMPLETE

With half pound of repair gum

Put one in your place of business. It takes up practically no room; requires no extra help; and will pay for itself many times over.

ADAMSON

MODEL S-1

VULCANIZER



TYPE "H"

OUR H-1 OUTFIT

consists of three Model S-1 supported by floor stand and provided with hood for flue connection.

Price Complete $30.00

Start a Tire and Tube Repair Department with an "Adamson."

Immediate shipments, order today.

ADAMSON MFG. CO.

East Palestine, Ohio.

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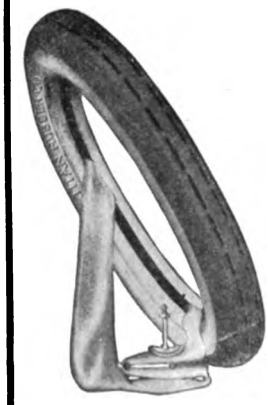
THE
ARMSTRONG MFG. CO.
BRIDGEPORT, CONN., U. S. A.
New York Office 248 CANAL ST.

like their products, need no introduction to the experienced steam or gas fitter.

To others, our Catalogue No. 14 will show why we are so popular.



"Makers of Genuine ARMSTRONG Stocks and Dies."



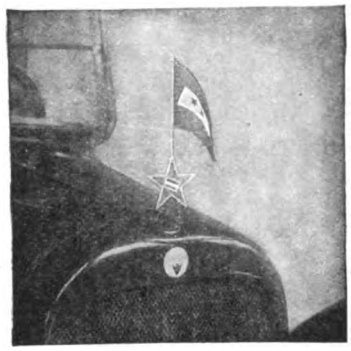
TITAN TIRES
GUARANTEED 4000 MILES

Stand head and shoulders above ordinary Tires for Strength, Speed and Dependability.
Write for our exclusive Dealers' Proposition.
Dealers' prices at 45% off List Price.

Non-skid	Gray Tubes		Non-skid	Gray Tubes	
30x3	$ 8.52	$2.12	33x4	$18 07	$3 48
30x3½	10.95	2.43	34x4	18.53	3.57
32x3½	12.92	2.60	35x4½	26 07	4.48
31x4	16.94	3.35	37x5	31.54	5.59

Prices on other sizes in proportion.
Adjustments on Day Mileage basis.
Titan Gray Laminated Inner Tubes are the best for the money and are **unconditionally guaranteed.**
All orders must be accompanied by Money Orders.

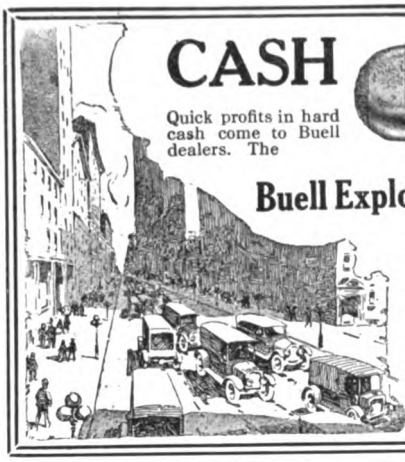
TITAN RUBBER COMPANY
Dept. C, 1412 Michigan Ave. - - Chicago, Illinois



THE
LIBERTY STAR FLAG HOLDER

strikingly original—with three bars of red, white and blue on bright face of star.
Fits any radiator cap, windshield, or inside limousine.
Star Holder and Flag $1.00.
If dealer cannot supply you, send money order, $1.10.
We also make lower priced flag holders of good quality throughout.
Dealers:—Write for a real special offer.

H. K. METAL PRODUCTS CO.
60 Grand St., New York.



CASH

Quick profits in hard cash come to Buell dealers. The



Buell Explosion Whistle

is the best selling auto warning device on the market because it's the best in actual service.

Get Our Proposition

BUELL MFG. CO.
1612 Michigan Blvd., Chicago



MAKE YOUR GREASE SALES MOUNT

by selling the one kind of lubricants that serve your customers best.

DIXON'S GRAPHITE Automobile LUBRICANTS

bring your customers back and make increased sales for you because they are the 100% lubricants.

Send for Dixon's Dealers' Deal No. 184-G

JOSEPH DIXON CRUCIBLE CO.
Jersey City, N. J.
Established 1827

INSURANCE AGAINST TROUBLE



MOTOR **SASCO** STRAINER

Made of special cast aluminum and easily installed in any gasoline or oil line, will absolutely prevent dirt and water from entering the carburetor.



Manufactured by
SAGE BROTHERS, Inc.
780 UNION STREET
BROOKLYN, N. Y.

Larger strainers for all purposes. Write for descriptive circulars and prices.

Special Request

¶ IN writing to advertisers for circulars or information, you are earnestly requested to mention in each case that the advertisement was seen in the "Automobile Dealer and Repairer." By so doing you will confer a favor on both publisher and advertiser



THE
BENTON
"THE CASE-HARDENED PLUG"

An unbreakable, wound mica insulator quickly cleaned by opening metal-to-metal joint and scraping or washing mica. Joint always gas tight. No deterioration from cleaning. Case-hardened wrench and thread surfaces. Service guaranteed.

Price $1.00

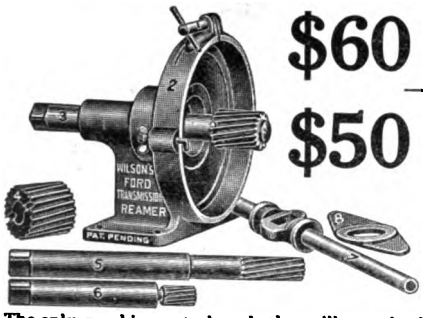
Write for our liberal Agency Proposition and a copy of Booklet shown.

L. F. BENTON CO.,
VERGENNES, VERMONT



Please mention the Automobile Dealer and Repairer when writing to advertisers.

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$60 Complete with triple gear attachment (as shown).

$50 Less triple gear attachments.

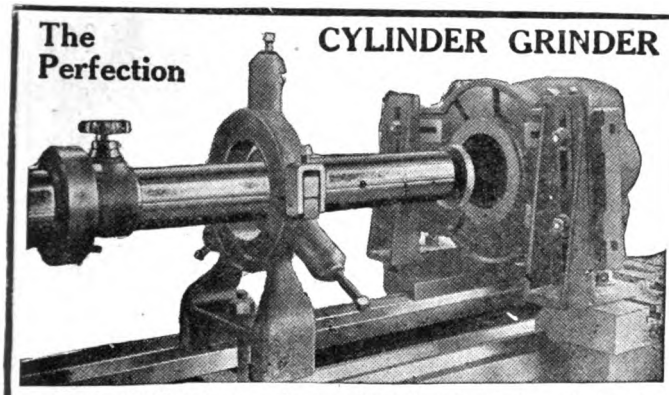
WILSON'S
Ford Transmission Bushing Reaming Machine

The only machine or tool made that will ream bushings in all three drums and triple gears. **Absolutely true, perfect fit and alignment.**

2 minutes labor required to set up and ream one bushing. 25 minutes to completely overhaul a transmission. Every job uniform. Saves 75% of labor costs. Send for special circular of other labor-saving tools.

K. R. WILSON, 1018 MAIN STREET, BUFFALO, N. Y.

The Perfection CYLINDER GRINDER



Can be attached to any ordinary engine lathe with a hollow spindle and a swing of fourteen inches or over. **Descriptive literature on request.**

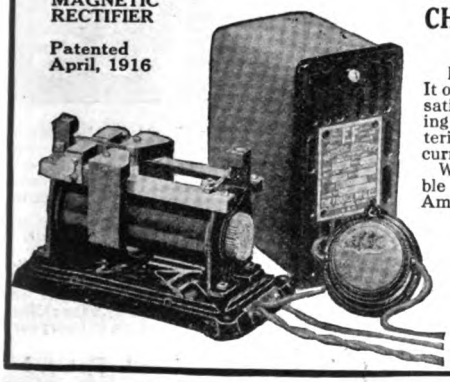
WOOD & SAFFORD MACHINE WORKS, GREAT FALLS, MONTANA

F-F BATTERY BOOSTER

Full Wave A. C. Rectifier

MAGNETIC RECTIFIER

Patented April, 1916



CHARGE YOUR OWN BATTERIES

For Public or Private Use.

It offers the most efficient and satisfactory means for charging all types of storage batteries where only alternating current is available.

We furnish complete portable Charging Rheostat with Ammeter and Current Regulator for service on D. C. Circuits.

$24 Complete, and up
F. O. B. Cleveland

The France Mfg. Co.
Cleveland, Ohio

Ask Your Dealer or Write for Bulletin No. 10

YOU CAN'T BEAT IT!

"THE FAMOUS" Little Giant Starter

FOR FORD CARS



A MECHANICAL STARTER OUT OF SIGHT

Entirely under the hood. Operated from driver's seat by foot pedal which locks against the dash, out of the way, when not in use.

Easily installed; safe, durable, dependable and always ready. Fully guaranteed. First cost is whole cost. GREAT MONEY-MAKING OPPORTUNITY FOR LIVE AGENTS. Two million Ford Owners want a Giant Starter.

THE LITTLE GIANT STARTER COMPANY
Factory and General Offices, CANTON, OHIO.

HAY-DEE EXTENSIONS

$55—for Fords—$60

"We WILL Conquer"

"Say Al, you look all down in the mouth!"

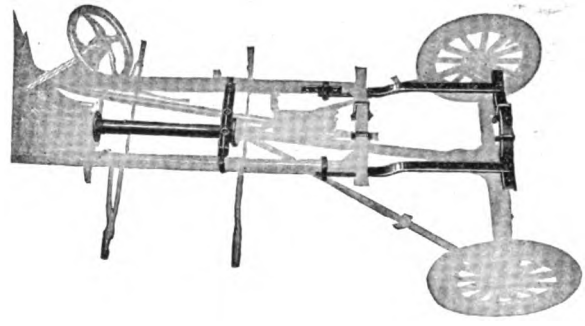
"I sure do! Every Ford dealer is up against it, good and strong. Can't get deliveries! Ford is doin' all he can, but that don't help my customers — there're howling!"

"Why don't you wake up? Instead of sittin' down and moanin', go over your old sales list. Get out and tell some of these fellows, this war means more than joy ridin' now—you've got to have cars to rebuild for commercial purposes to keep business movin'!"

"How are y' goin' to do that? Say, listen, do you believe in signs? Look at that sign up there!! By that sign Ford dealers will conquer."

"That Hay-Dee Extension is the greatest proposition on the market today. A wrench and a hammer, not a cut or a hole, and you can make a big delivery car out of any ol' Ford. Y' get 8 to 12 feet of loading space, never touch the engine or the frame—better than ever! Get busy, write Hay-Dee today. It's a life-saver for us!"

"Thanks, ol' man, I'll write 'em now, for the "dope sheet."





HAY-DEE EXTENSIONS

A Business Builder for Ford Dealers

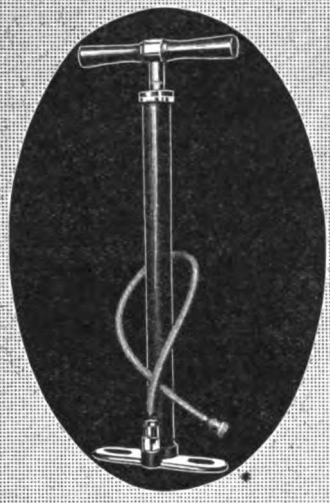
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HAYES & DIEFENDERFER CO.

1872 Broadway • New York

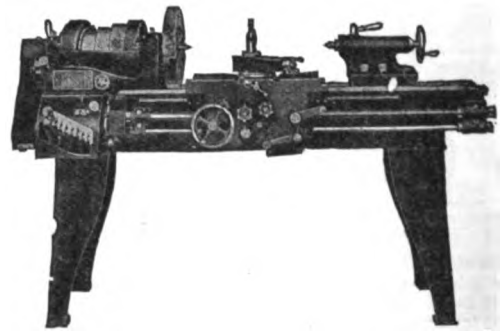
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THE
ANTHONY
TIRE PUMP



EXAMINE IT
AND YOU WILL
BUY IT

The Anthony Company Long Island City, New York.



14"x6' Monarch Lathe
Other Sizes, 16, 18, 20-Inch

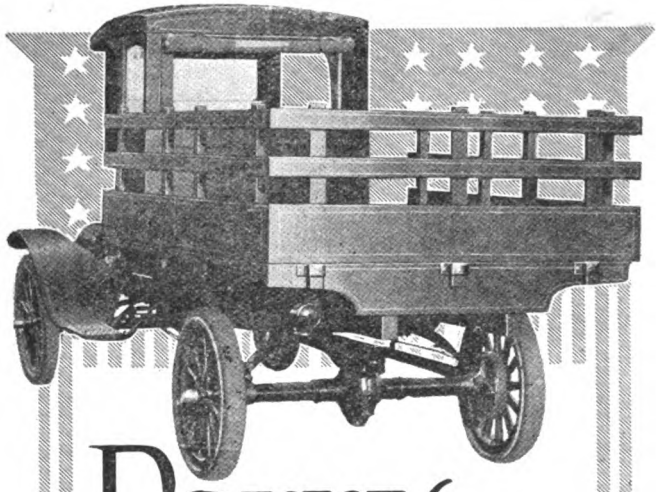
Monarch Lathes are very accurate, rigidly constructed, modern in design and quick and easy to operate. They are recognized by the Automobile Repairmen as the best lathe for Garage use.

Monarch Lathes are low in price and within the reach of every garage owner. They are used in every class of work from the finest toolroom work to production work in the largest factories.

Furnished with taper attachment, milling, keyway cutting and gear cutting attachments, and other attachments useful in the Auto Repair Shop.

Send today for catalog No. 11 and prices

THE MONARCH MACHINE TOOL CO.
SIDNEY, OHIO



Parry
Bodies for
Ford Chasses

PARRY MFG. CO.
INDIANAPOLIS, U. S. A.

Guaranteed for
10,000 Miles



EVERY Brictson Tire is sold under a specific 10,000 mile written service guarantee. This guarantee is the longest and strongest ever put behind a pneumatic tire and is a positive protection to every purchaser.

"Absolutely Puncture Proof"

Brictson Tires are puncture proof, and proof against blowouts, skidding, rut wear, rim cuts, and can't be damaged by oil or gasoline. Wonderful resiliency, easy riding and economy commend them to every car owner.

The Big One-fourth Retread Feature

Should the tread surface wear out after 10,000 miles of service you can get a new retread for one-fourth the original cost of the tire, instead of buying a new tire, and you keep the remaining three-fourths in your pocket. With ordinary service the Brictson Tire should run enough beyond the 10,000 miles to require one or two extra retreads. The more retreads you use the cheaper your service.

FREE TRIAL OFFER

To convince you the Brictson Tire will give satisfaction TRY THEM ON YOUR CAR AT OUR EXPENSE. Write today for this Free Trial Offer, a copy of our guarantee and full information about Brictson Tires.

BRICTSON MFG. COMPANY
Dept 148
1015-24 Woodmen of the World Building
OMAHA, NEBRASKA

Brictson Pneumatic Tires

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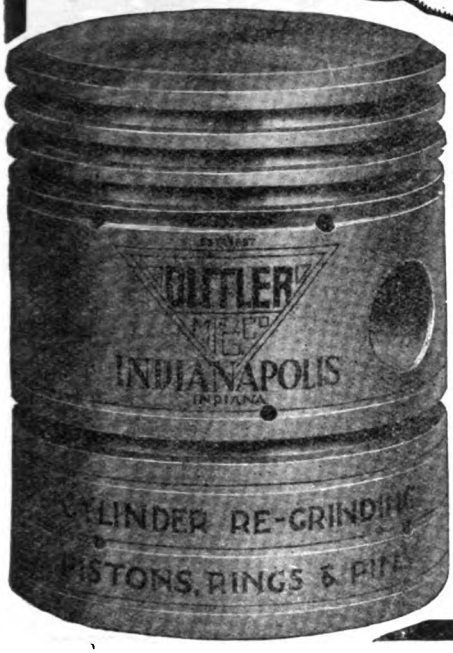
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We Can Save You Money

—ON—

CYLINDER REGRINDING



Light-Weight Semi-Cast or Standard Cast-Iron

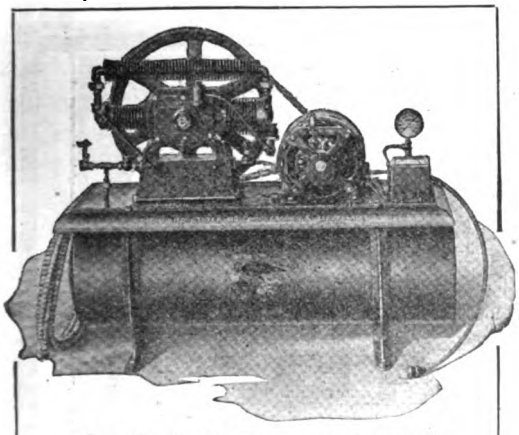
PINS **PISTONS** **RINGS**

For All Make and Size Engines

Standardized Work and Prices with records kept of job is your Protection. We have 600 different make and size pistons; are the largest exclusive cylinder regrinding and oversize piston and pin shop in the Middle West.

EST.—1897 BUTLER MFG. CO. Quality Work

BUTLER MFG. CO.
1121 East Georgia Street
Indianapolis, Ind.

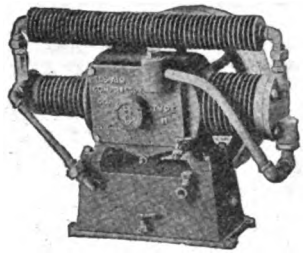


The U. S. De Luxe Automatic Air Unit

utilizes the principle of **Two Stage** operation and is without doubt the most efficient air compressor in existence—the ideal unit for free air stations, garages and tire shops.

The De Luxe proves a business getter wherever installed. Many of the better garages contain this outfit and several companies of national prominence use it as standard equipment.

Capacity 4 cubic feet per minute. Contains 14 points of excellence.

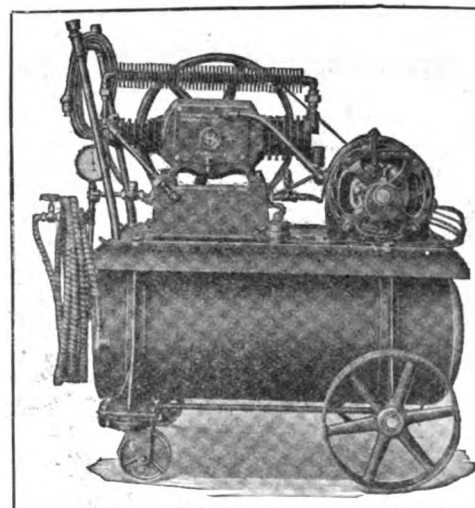


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has capacity of 4 cubic feet per minute and utilizes the **Two Stage** principle to which the remarkable success of U. S. compressors is due.

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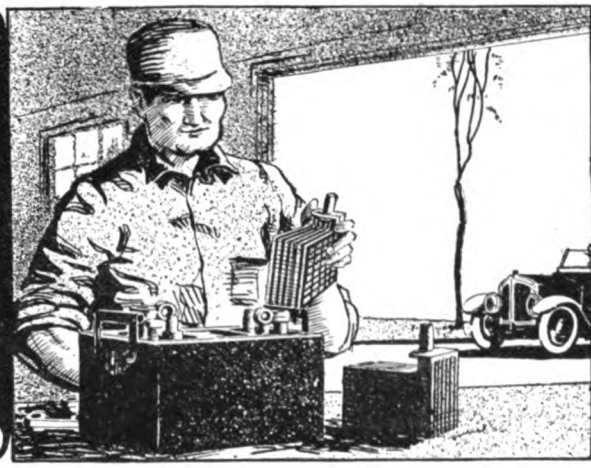
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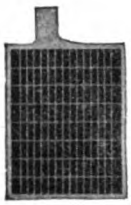
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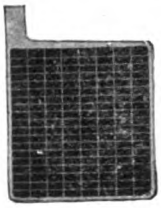


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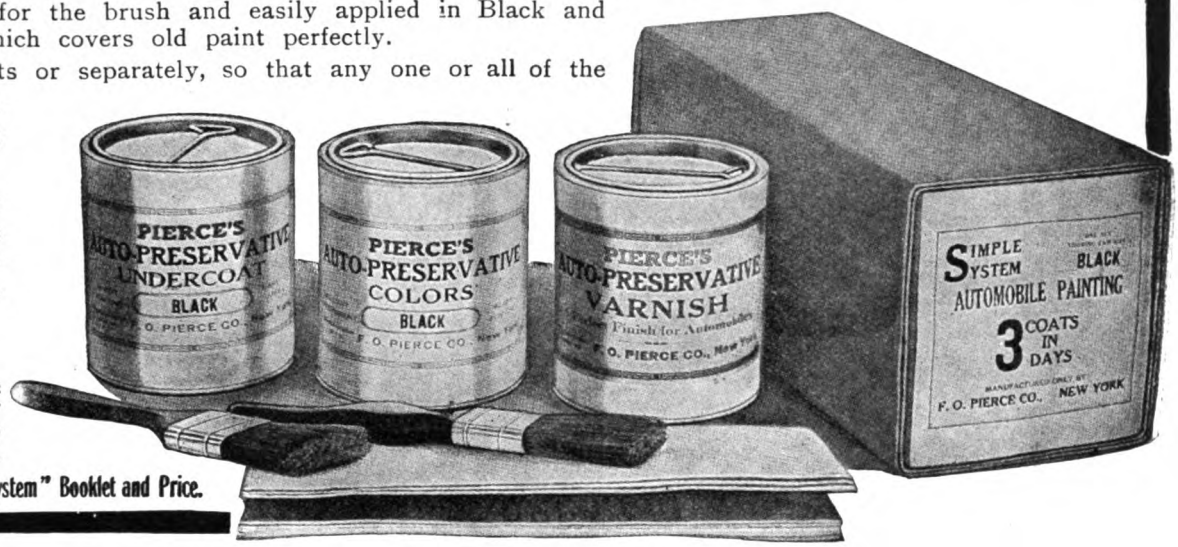
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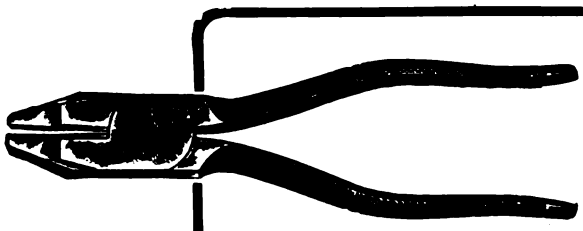
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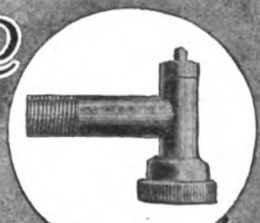
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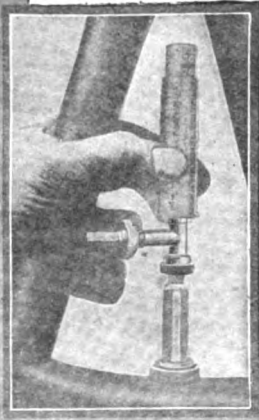
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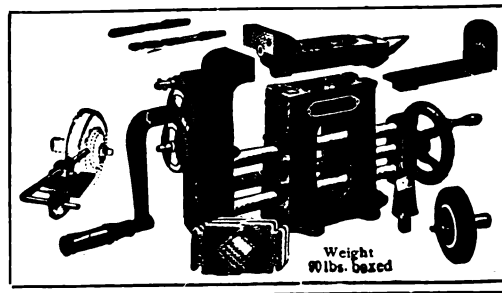
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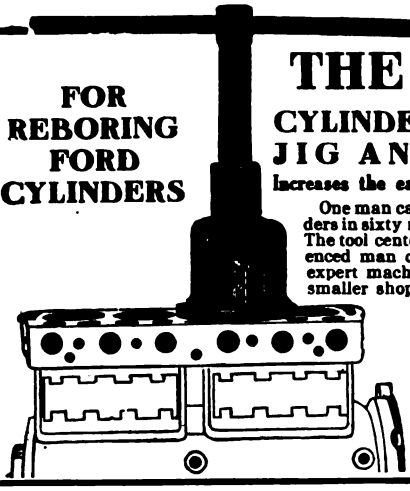
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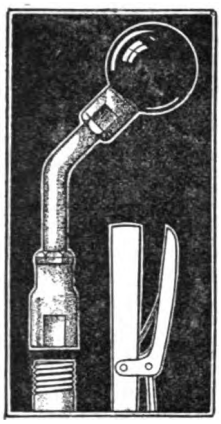
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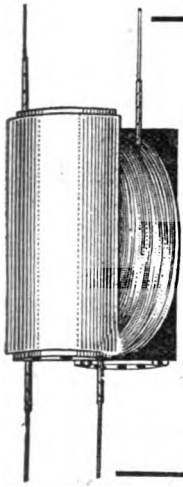
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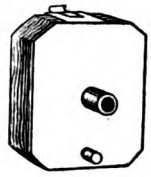




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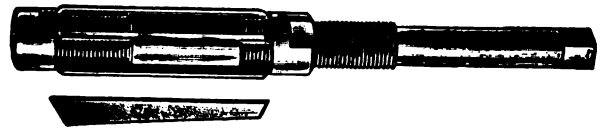
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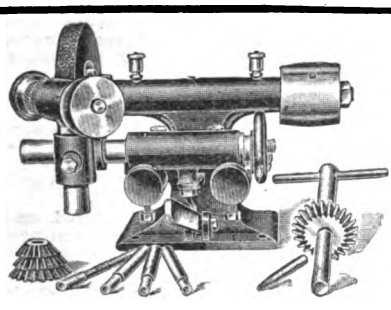


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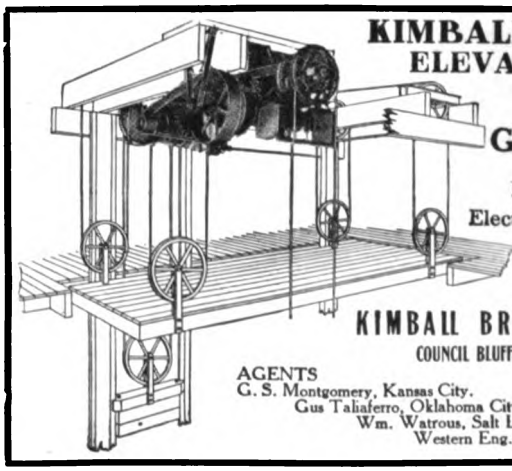
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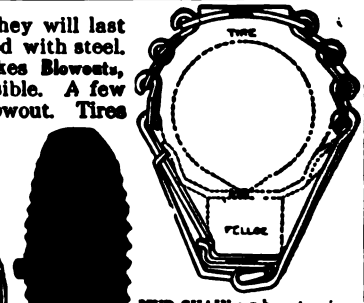


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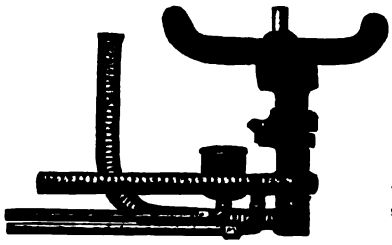
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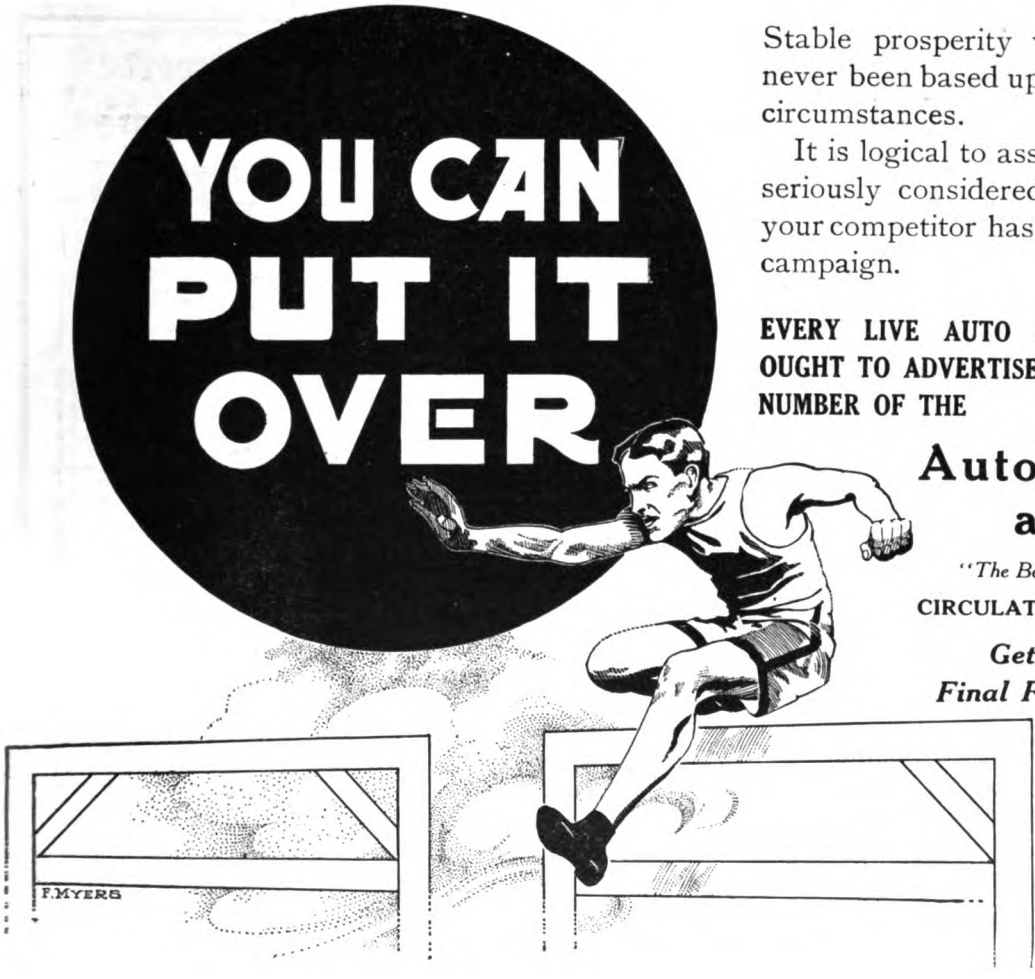
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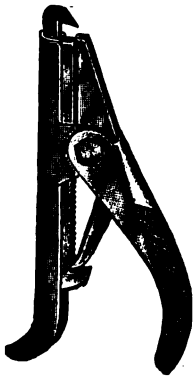
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E	2	1	12	8½
F	2¼	1¼	12	10
G	2½	1½	12	11½
H	2¾	1¾	12	12¾
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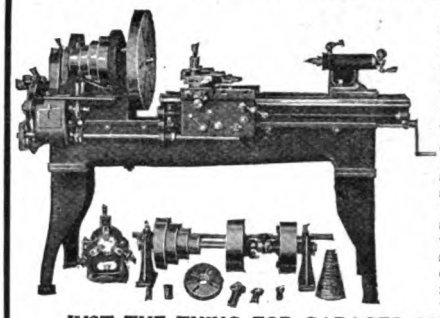
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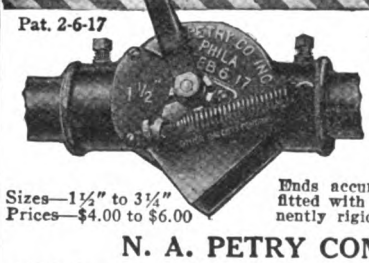
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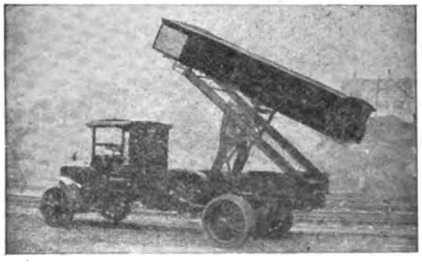
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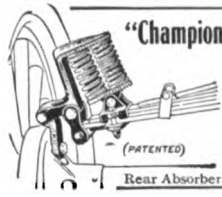
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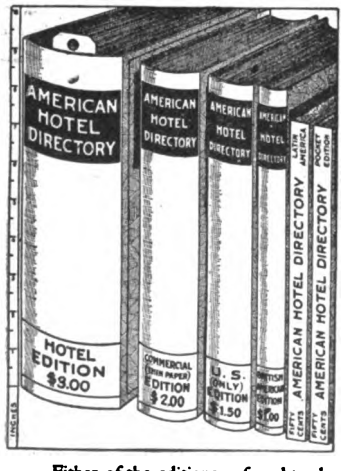
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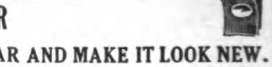
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32x4	4.75	8.00	10.00	3.20
33x4	5.25	8.25	10.25	3.30
34x4	5.50	8.50	10.50	3.40
36x4	5.75	8.75	11.00	3.50
34x4½	5.75	9.00	11.50	4.10
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Ever Safe Emergency Brakes for Ford Car
Adjustable. Will fit any Model T Ford, old or new. Absolute safety. Wide range adjusting shims.



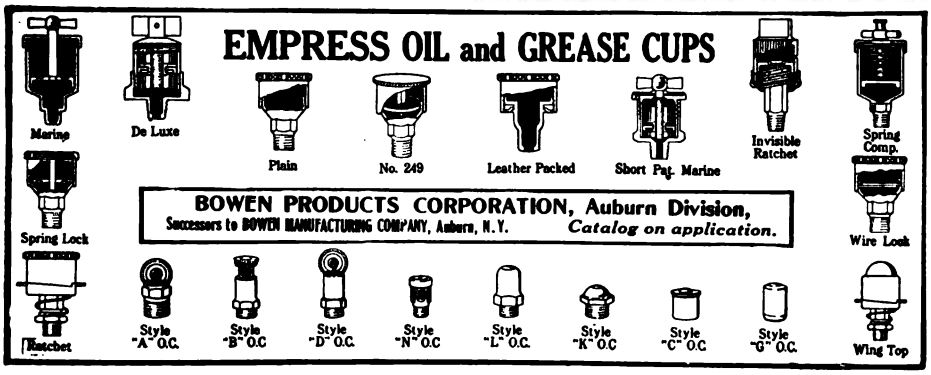
For rear wheels—made of band steel.
Asbestos lined, per pair..... $2.50
Brass lined, for extreme conditions, per pair $3.50
Extra flexible interchangeable metallic linings (ready to attach), per pair.....$2.25
Unconditional Guarantee
No changes to make—installing directions on every box.
See your dealer; he has them. Insist on the Ever Safe.
Never Break Products Co., Bangor, Penna.

Quality and Prices
TALK
GEARS SHAFTS BEARINGS
For All Cars
TIRES — NEW—USED — TUBES
Exceptional Values at Lowest Prices.

	Factory Blemished New Tires	New Tubes	Used Tires	Used Tubes	Double Tread Tires
28 x 3	$ 7.75	$2.25	$3.50	$1.25	$4.15
30 x 3	7.50	2.00	3.75	1.35	4.75
30 x 3½	9.55	2.40	4.65	1.45	5.80
32 x 3½	11.25	2.65	5.25	1.50	6.75
31 x 4	13.95	2.80	6.75	1.65	6.95
32 x 4	13.45	2.90	7.00	1.60	7.15
33 x 4	13.55	3.35	7.50	1.70	7.80
34 x 4	15.90	3.50	7.75	1.70	8.00
34 x 4½	17.85	3.80	7.90	1.75	9.65
35 x 4½	21.00	4.00	8.50	1.80	10.15
36 x 4½	18.95	4.00	8.00	1.85	10.40
37 x 5	21.50	4.00	9.50	2.10	11.50

All tires 10% more for Non-Skid. Other sizes in proportion.
Open Evenings and Sundays.
One dollar or deposit sufficient to cover express cost required with each order.
Shipments Made Promptly Subject to Inspection.
AUTO NEEDS CO.
1602 S. Michigan Ave. Chicago, Ill.
Dept. P1.

EMPRESS OIL and GREASE CUPS



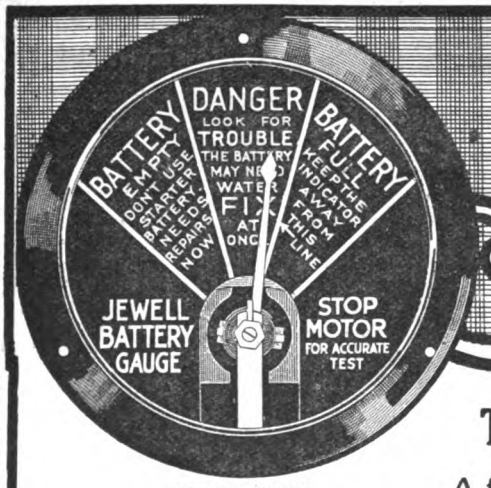
BOWEN PRODUCTS CORPORATION, Auburn Division,
Successors to BOWEN MANUFACTURING COMPANY, Auburn, N.Y. *Catalog on application.*

Send for free sample of The Automobile Dealer and Repairer.
MOTOR VEHICLE PUBLISHING CO.
71-73 Murray Street, New York

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Jewell BATTERY GAUGE

The Ever Watchful Guardian of Your Battery

PRICE $5.00

A fire alarm that would tell you your house had burned by testing the ashes would get mighty little consideration,—yet that is about the size of a semi-monthly hydrometer test of your storage battery.

The JEWELL Battery Gauge warns you instantly "at the first indication of smoke and long before the fire begins."

You do not have to test or even investigate, the information is constantly before you, as easily read and more accurately told than the story of your speedometer.

The most valuable accessory ever put on a car.

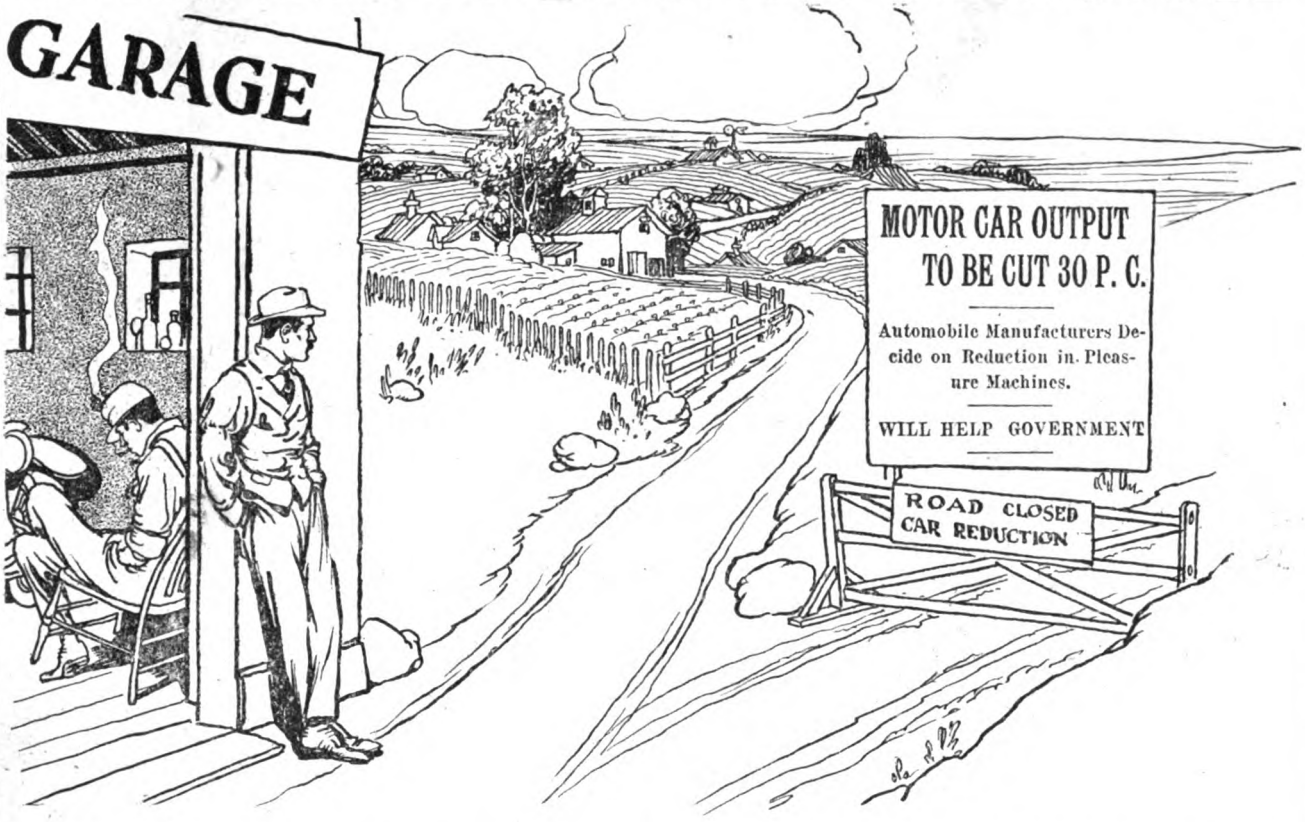
Dealers, write for circular and discounts

MANUFACTURED BY
THE JEWELL ELECTRICAL INSTRUMENT CO.
1646 W. Walnut Street, Chicago

EXCLUSIVE SALES REPRESENTATIVES
GRAY-HEATH COMPANY
1440 Michigan Ave., Chicago

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DEALERS AND GARAGE OWNERS – TAKE THE OPEN ROAD TO PROFIT



What if your sales of cars are falling off? Don't worry. You must and can keep on doing business at a profit—

By selling

Western Electric
POWER AND LIGHT

Labor on the farm is hard to get and still harder to keep. Electric power and light—the Western Electric kind—is the answer. It is being advertised extensively—a full page in the Saturday Evening Post on April 20 and advertisements in 20 of the leading farm papers. You can easily get your share of the business.

THE TERRITORY IN WHICH YOU LIVE MAY BE OPEN

Mail the coupon and get the full details

Western Electric Company INCORPORATED _____ 1918

Dept. 721., 195 Broadway, New York

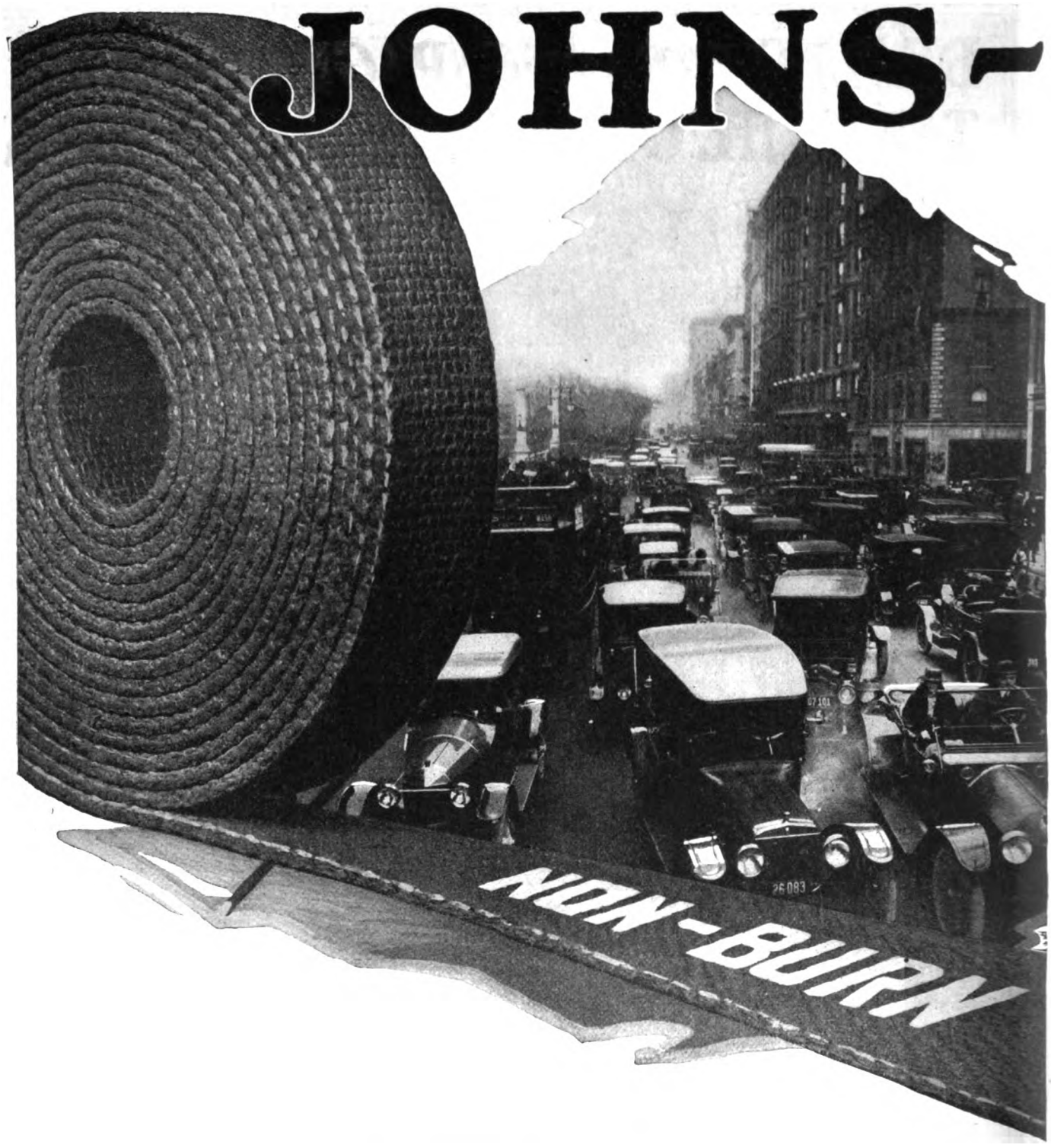
I am interested in learning more about your sales agency proposition, and how I can sell Western Electric Power and Light.

_____

_____

A D R.

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A HALF century of experience manufacturing brake linings has taught us that the secret of braking safety, efficiency, and durability lies in the kind of asbestos fibre used. We put only selected fibre from our own mines into NON-BURN—that's why it wears—and sells.

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MANVILLE

NON-BURN ASBESTOS BRAKE LINING

Brake lining like this is a repair man's good-will builder

PEOPLE bring their cars into your shop the first time because they are in trouble. And they come back or they don't, depending on the impression they get of you and your service. As a rule your customers are not mechanics —they cannot inspect and recognize a good mechanical job—but they expect a job to last. And it is just like that when you reline brakes.

Perhaps you can put over *any* lining but you don't want to because it is not good business. Non-Burn on a customer's bill flashes quality to him and he thinks a lot more of you as a service man because he knows about Johns-Manville and asbestos. He has read the asbestos pedigree of Non-Burn in hundreds of advertising stories and you capitalize on all this good-will when you sell this lining.

Now go a step farther—not only install Non-Burn but sell it by talking it—because there is a good profit in it. Perhaps it is natural that Non-Burn quality should be reflected in the policy under which it is sold—the fairest and most liberal sales plan we could devise. Non-Burn is distributed strictly through regular jobber-dealer channels. Discounts are generous, rigidly maintained and uniform, regardless of quantity—permitting rapid turn-overs and protecting your profits. Details on application.

H. W. JOHNS-MANVILLE CO.
NEW YORK CITY
10 Factories—Branches in 61 Large Cities



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SOME of these big advertisements have already appeared in such magazines as SATURDAY EVENING POST and LITERARY DIGEST. They occupy pages and half-pages. They are running practically once a week. They are being read by millions of car owners. They are selling Enamel.

We know Da-cote to be the best article obtainable by a car owner who plans to paint his own car. It flows on smoothly without leaving brush marks. It dries over night. It has a hard, glossy, durable, elastic surface. It will please every owner who tries it, both for looks and wear.

Order a 16 gallon assortment. Get our brilliant and novel window displays. Use our dealer electros and other aids in selling. Our salesmen will explain.

Profits are big. Demand is urgent. Sales are easy. Customers are satisfied.

Murphy Varnish Company *Franklin Murphy, jr., President* **Newark, N. J. Chicago, Ill.**

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TIRE REPAIRING THE BUSINESS OF THE TIMES

Start a Tire Repair Business

Help keep in service the millions of motor cars that are meeting the war-time patriotic and necessary industrial demands of the Nation.

Help conserve the Nation's supply of fabric and rubber.

Help to meet the increased demand for tire repairing, due to high cost of tires.

Start Right with This Great Equipment, New-Type-F

THE WORK IS MOST PROFITABLE AND INTERESTING,

TIP-TOP OF AKRON TI-RE-PAIR OUTFIT

Big Capacity Vulcanizer, with Self-Contained Boiler, Only $180

AS WELL AS FILLING A PRESENT DAY USEFUL NEED.

An Outfit with the Specifications and High Quality of This One Cannot Be Obtained Elsewhere at Anywhere Near This Price

SPECIFICATIONS:

Equipment consists of two cavities; one 4½-5 in. and one 3½-4 in., the 3½-4 in. cavity being provided with Reducing Shell to take 2½-3 in.

Also fitted with Inside Patch Attachment, 3½-4 in., on which practically all sizes of inside work can be done.

Equipped with Self-Contained Boiler.

Set of Bead Molds, 4½-5 in., 3½-4 in., 2½-3 in., in either Quick Detachable or Straight Side furnished with each outfit.

Made in one-fifth circle only.



OVER THE TOP

With a Tip-Top Ti-Re-Pair Outfit

Sez "Little Tip-Top"

Be Sure to Read Our Booklet

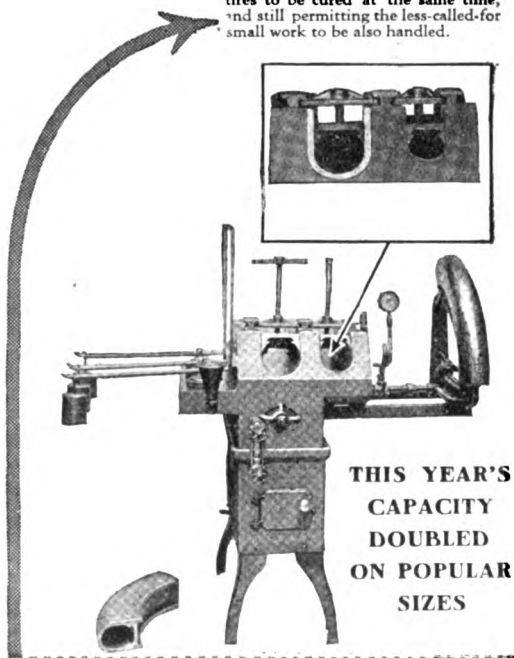
"Tire Repairing, the Business of the Times"

It tells you of the opportunities for men in the Tire Repairing Business today.

We Make a Complete Line of Tire Repair Equipment

Catalog on Request

This year 2½-3 inch Cavity has been increased to 3½-4 inch, and provided with a Reducing Shell to take 2½-3 inch, thus permitting two popular size tires to be cured at the same time, and still permitting the less-called-for small work to be also handled.



THIS YEAR'S CAPACITY DOUBLED ON POPULAR SIZES

THE AKRON RUBBER MOLD & MACHINE CO.

Manufacturers of Tire Repairing and Tire Builders' Equipment

919 Sweitzer Ave. Akron, Ohio

Pacific Coast Distributors:

THE GEO. W. ENO RUBBER CO.

280 Golden Gate Ave., San Francisco 1026 S. Los Angeles St., Los Angeles

Please send full particulars regarding your Ti-Re-Pair Equipment and copy of free booklet.

NAME .....

ADDRESS .....

A. D. & R. .....

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BENFORD'S GOLDEN GIANT

Watch the Bunghole First

SUPPOSE you *do* save a nickel on a spark plug? Is it a *real* saving? Some people think they save time by stopping a clock. It can't be done. "Saving at the spigot and wasting at the bunghole"—we wrote that in our copy-books, you and we, years ago. Did we learn the lesson?

A cheap spark plug is always *cheap*. It's only a business accident when you can buy an article at less than its worth.

Buy the best—for only the best will do in modern motors. When gasoline was so good that it would explode on suspicion, perhaps "ornery" plugs were all right. But low-grade gasoline and high-speed, high-compression motors have put junk plugs into the eternal discard.

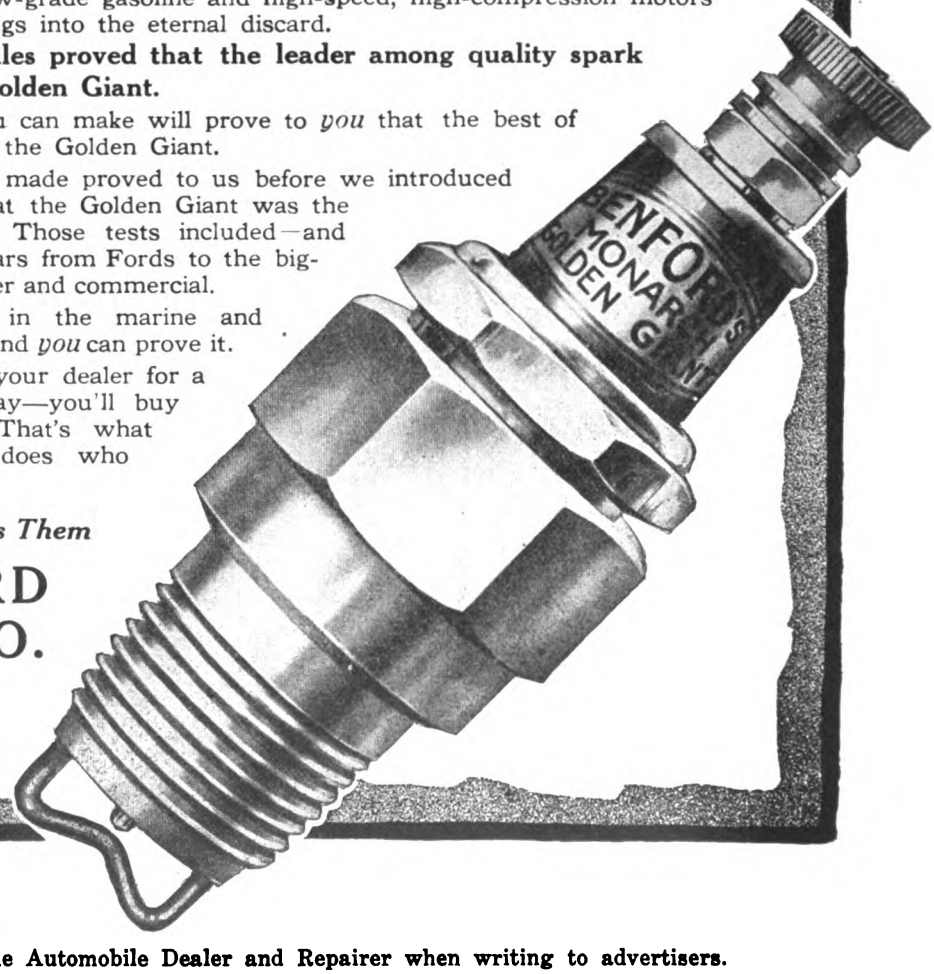
Last year's sales proved that the leader among quality spark plugs was the Golden Giant.

Every test you can make will prove to *you* that the best of all spark plugs is the Golden Giant.

Every test we made proved to us before we introduced it—and *since*—that the Golden Giant was the best spark plug. Those tests included—and still include—all cars from Fords to the biggest, both passenger and commercial.

It leads also in the marine and motorcycle field—and *you* can prove it.

How? Ask your dealer for a Golden Giant today—you'll buy the set later. That's what everybody else does who makes the trial.

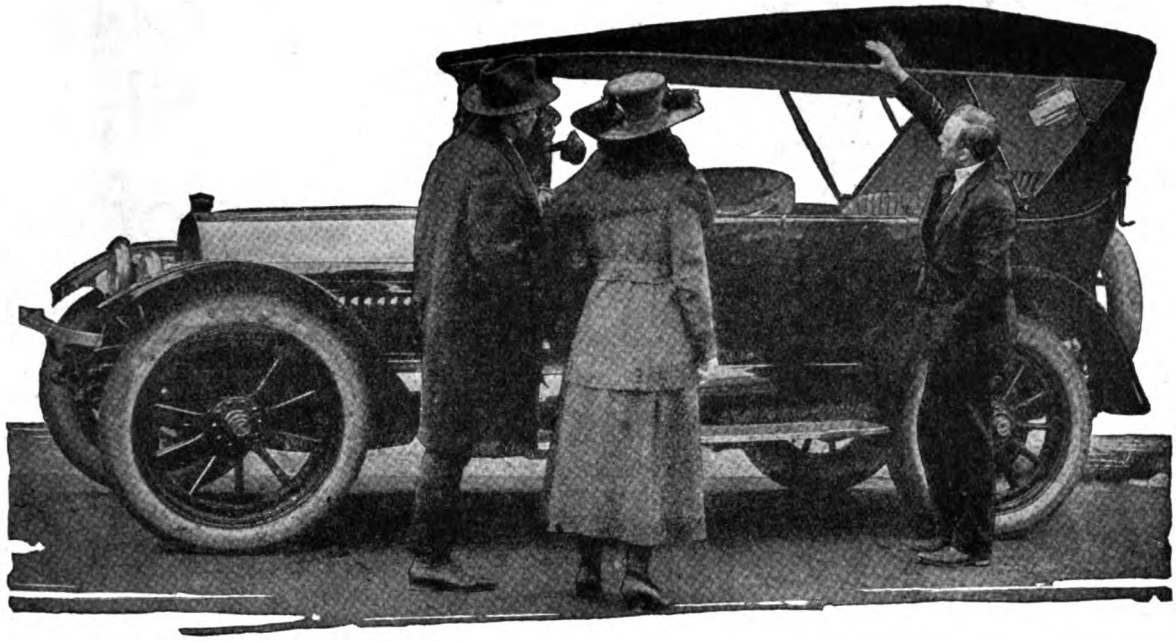


Your Dealer Has Them

BENFORD MFG. CO.
Mt. Vernon N. Y.

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DU PONT AMERICAN INDUSTRIES



RAYNTITE FABRIKOID--The Tip-Top Top

Thousands of cars look old and seedy because of dingy, faded, leaky tops. If your car is in this class why not have your local top maker restore its snappy appearance and give it enduring serviceability by putting on a new, beautiful top made of Rayntite Fabrikoid.

DU PONT FABRIKOID RAYNTITE

is made to stand heat, cold, rain and snow without losing its fresh appearance. We specifically guarantee it for one year not to leak, crack nor peel—but it's made to last the life of the car. Why not end your top troubles once and for all with a top backed by a Du Pont guarantee. Check Rayntite in the coupon.

Send for free sample and tell us the best top maker in your locality.

Mark X before subject that interests you and Mail This Coupon to

E. I. DU PONT DE NEMOURS & CO.
ADVERTISING DIVISION
WILMINGTON A. D. & R. DELAWARE

	Craftsman Fabrikoid		Auto Enamel
	Motor Fabrikoid		Industrial Dynamites
	Rayntite Top Material		Blasting Powder
	Fairfield Rubber Cloth		Farm Explosives
	Challenge Collars		Huntings&Trapshooting
	Py-ra-lin Toilet Goods		Anesthesia Ether
	Transparent Sheeting		Metal Lacquers
	Py-ra-lin Rods & Tubes		Pyroxylin Solvents
	Sanitary Wall Finish		Bronze Powder
	Town & Country Paint		Commercial Acids
	Vitrolac Varnish		Alums
	Flowkote Enamel		Pigment Bases
	Antoxide Iron Paint		Tar Distillates
	Bridgeport Finishes		Py-ra-lin Enamels

Name _____

Address _____

City _____ State _____

Business _____

Visit the Du Pont Products Store,
1105 Boardwalk, Atlantic City, N. J.

Du Pont Fabrikoid Company

World's Largest Manufacturers of Leather Substitutes
WILMINGTON - - DELAWARE
Works at Newburg, N. Y. and Fairfield, Conn.
Canadian Office & Factory, New Toronto, Ont.

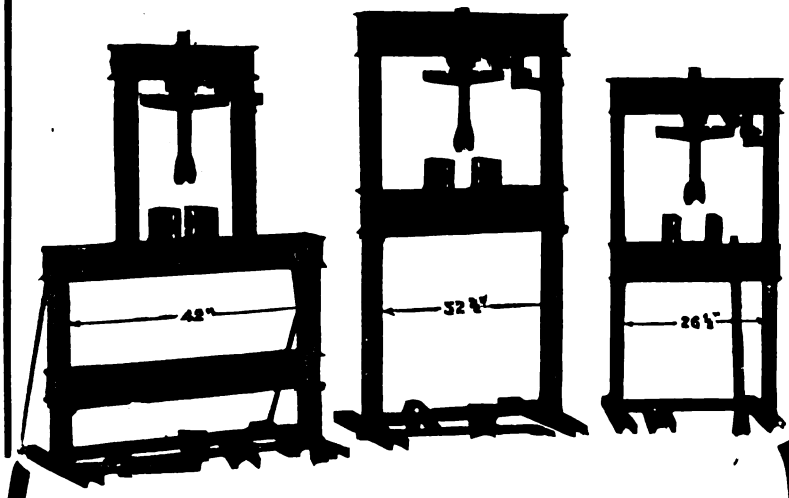
THE DU PONT AMERICAN INDUSTRIES ARE:

E. I. du Pont de Nemours & Co., Wilmington, Del., Explosives
Du Pont Fabrikoid Co., Wilmington, Del., Leather Substitutes
Du Pont Chemical Works, Equitable Bldg., N.Y., Pyroxylin and Coal Tar Chemicals
The Arlington Works, 725 Broadway, N. Y., Ivory Py-ra-lin and Cleanable Collars
Harrison Works, Philadelphia, Pa., Paints, Pigments, Acids and Chemicals
Du Pont Dye Works, Wilmington, Del., Dye and Dye Bases

DU PONT

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Manley 22-Ton Garage Presses Make Short Work of Long Jobs



Every Garage needs a Manley Press, especially for those obstinate time-wasting jobs—the kind of jobs that eat up so much time you frequently hesitate to charge for all that was actually put in on the wor!. That's the reason why the "hardest" jobs are usually the least profitable in repair work and why a Garage must be equipped with a Manley Press to satisfy its customers.

Manley Presses were designed especially for repair work of this nature. Their many exclusive features are practical advantages that adapt them for garage work and insure them being time savers and money makers.

Universal Auto Press	No. 1 Garage Press	No. 2 Garage Press
PRICE	PRICE	PRICE
$66.00 Net	$64.50 Net	$47.75 Net

Auto Bench Press is the top half of the Universal Auto Press. Price $39.00 net. Bottom half may be purchased at any future time, converting it into the regular Press.

Four Sizes to Choose From

Doesn't it stand to reason that one size Press cannot satisfy all Garage Requirements? From the Manley Line of four different sizes you can select the particular Press that fits your work to the best advantage.

See the Exclusive Features You Get When You Buy A Manley Press.

Look around and satisfy yourself that no other press has them. Features which are practical and absolutely necessary in a Garage Press if it is to handle every job from the smallest to the largest in the shortest time with the least effort.

High Speed Sensitive Leverage of 1000 to 1 for light work, quick—saves time, effort and damage to work.

High Power Leverage of 2200-5000 to 1 for heavy work—powerful—gives tremendous pressure. Change in leverage instantly made—no bolts to remove.

42 in. Clearance (Universal Auto Press) takes in every piece used on automobiles.

Tables instantly adjustable on pins. No bolts.

Tables have wide surfaces to properly support the work.

Screw 2 in. diameter, 4 pitch Acme thread, 12 in. travel and does not revolve.

Channel Blocking is braced.

"V" Face Plate automatically adjusts itself to any size shaft on hub.

Bolted Construction, possible to admit a frame, etc., under screw.

Screw Exposed at the top may be struck a blow in extreme cases when pressure alone fails.

Test Centers equal to a special straightening Press. (For a few dollars extra.)

Let Us Send You Detailed Information on Manley Garage Equipment

The United Engine & Mfg Co.

Hanover, Pa.

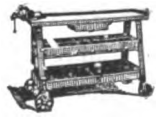
Pioneers and Largest Manufacturers of Heavy Garage Equipment—Today the Recognized Standard



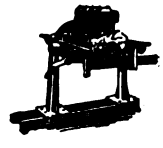
Automatic Air Hose Reel



Oil Services, 1, 2 and 3 tank



Portable Work Benches in 2 sizes



Engine Stands, Universal and Ford



Portable Floor Cranes, 3 capacities

Manley Garage equipment provides you with a means of doing twice as much work with the same number of men, it therefore doubles the efficiency of your shop

Announcing the Chicago Show Contest Prize Winners

Wm. R. Sommerkamp, care of Wm. R. Sommerkamp & Co., Automobile Dealers and Repairers, Cincinnati, Ohio, won the No. 76 crane.

Look for These Winners in Our Ads. You May Be One of Them

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Makes a Perfect Permanent Repair





6 Round Patch & Heat Units for Punctures
Additional Supply 75c per dozen

Complete Outfit $1.50

Includes

12 Patch & Heat Units



6 Oblong Patch & Heat Units for Cuts and Tears
Additional Supply 75c per dozen

The Patch & Heat Unit consists of a chemically treated combustible disc on one side and a pure para rubber patch on the other. This fits over the puncture and a match is applied to the chemical disc. Without blaze or flame this disc furnishes the proper heat, which seals the cut in the tube with the new rubber, making a permanent **repair.**

The Patch & Heat Unit is all ready to clamp on the tube. The fuel in its metal container and the rubber patch itself are all assembled. No different parts to lose or complicated application to the tube. Simply put the unit over the puncture, clamp **it down and apply the match.**

SHALER

5 Minute Vulcanizer

The fact that over 500,000 motorists are now using the SHALER 5-Minute Vulcanizer is convincing proof of its ever-increasing popularity. Every motorist is a prospect for one of these handy tube vulcanizers—it should be in every car owner's tool kit—for use anywhere—on the road or in the garage.

Sell the SHALER 5-Minute Vulcanizer. Every sale of a 5-Minute Vulcanizer gives you a good profit. Besides, the big resale of patch-and-heat units furnishes you a continuous profit—it brings motorists to your place for SHALER supplies—and for all sorts of other accessories.

The SHALER 5-Minute Vulcanizer with 6 Round and 6 Oblong Patch & Heat Units packed in attractive display carton.

ORDER FROM YOUR JOBBER *NOW!*

Don't delay! The enormous demand for this popular vulcanizer makes it necessary to place your order early if you want to be sure of prompt shipment. Any jobber in the United States can supply you. Our large catalog describes the complete line of SHALER Vulcanizers for motorists' use—also complete equipment for garages and tire repair shops. Mailed free on request.

C. A. SHALER COMPANY, 804 Fourth Street, Waupun, Wis.

Oldest and Largest Manufacturers of Vulcanizers

Please Mention the Automobile Dealer and Repairer when writing to advertisers.

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UNCLE SAM'S

Latest Assistant
The Miniature

THRIFT BANK

Is designed to sell U. S. THRIFT STAMPS automatically



Deposit your quarter savings and get receipt—A Twenty-five Cent Thrift Stamp.

These new miniature Thrift Banks will soon be found wherever Thrift Stamps are sold by authorized agents, for they save time in selling and accounting and actually increase the sale of stamps.

They require no attention other than to keep them filled with the special roll form of United States Thrift Stamps, that may be had in amounts of fifty or one hundred stamps.

Simply deposit a quarter, turn the crank and a Twenty-five Cent Thrift Stamp is delivered in clean sanitary form and the transaction is recorded.

All coins, other than quarters, are returned to the user and will not operate the bank.

These handsome all metal and glass devices are substantially made, mechanically perfect, small in size and light in weight. May be placed in use anywhere and locked in place if you wish.

These banks are loaned at a cost to you of less than four cents per day.

Your order for one or more of the banks may be placed direct with us.

The National War Savings Committee

51 Chambers St., New York City

OR WITH THE GENERAL DISTRIBUTORS

THE SCHERMACK CORPORATION

16th FLOOR KRESGE BLDG. DETROIT, MICH.

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Why—



IT'S MONEY in your pocket when you can establish a reputation for rapid service among car owners in your neighborhood.

That is one reason why you should push Harvey Springs

Besides rapid service, the product you sell must be of good quality, honestly made.

That is another reason why you should push Harvey Springs

A product that has made a name for itself and has gained the good will of car owners is much easier to sell.

That is still another reason why you should push Harvey Springs

You will generally find that a product in which you, yourself place absolute confidence a product you feel sure of, is easy to dispose of at a profit.

And that too is a reason why you should push Harvey Springs

Satisfaction to car owners — satisfaction to dealers — that is the ideal combination.

And that is the final reason why you should push Harvey Springs

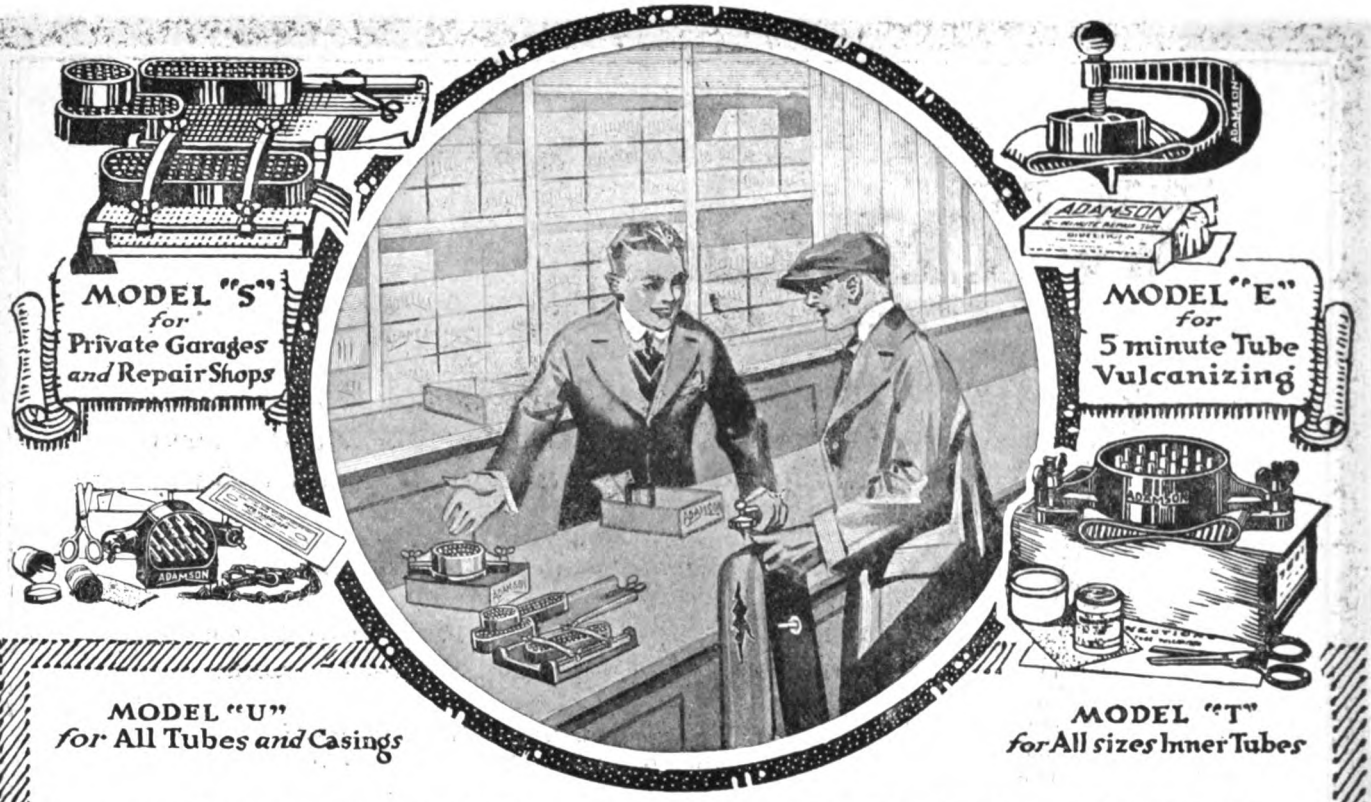
THERE'S A HARVEY JOBBER NEAR YOU — Write us and we will send you his name and address, and our latest catalog, giving complete specifications of over 900 different styles of Springs.

Write today — you may need Harvey Help tomorrow.

Harvey Spring & Forging Co.

921 17th Street **Racine, Wisconsin**

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SELL HIM WHAT HE NEEDS

AID your customer in his fight against Tire Expense, by getting in the "Adamson Line"—a true and tried Vulcanizer for every repair a motorist can make.

Remind him that every Adamson model uses that dependable and reliable fuel, Common Gasoline—easy to get, and easy to use. *Tell him* about the new Dry Fuel feature of Model "E" for repairing tube punctures in 5 minutes. *Show him* Adamson Repair Gum, the One material for best results with Any portable vulcanizer. *Sell him* the Adamson outfit he needs—Inexpensive to buy and use, Simple in operation, and Surest of all in results.

Outfits—
$1.00, $1.50,
$2.00, $12.00

ADAMSON
VULCANIZERS

Outfits—
$1.00, $1.50,
$2.00, $12.00

First Line of Defense for the Motorist



Let us send you this store display and other Sales Helps

Loose treads, blow-outs and short mileage are caused by cuts in the tread and side-wall, which let moisture and dirt into the fabric to rot and weaken it.

Help your customer to stop tire waste and increase tire mileage, by selling him an Adamson Model "U" to heal these injuries and protect the fabric, the only sure and lasting way—by vulcanization.

We are telling your customers that you sell Adamson Vulcanizers—are we right?

Sold by all Jobbers

Adamson Manufacturing Co.

EAST PALESTINE, OHIO

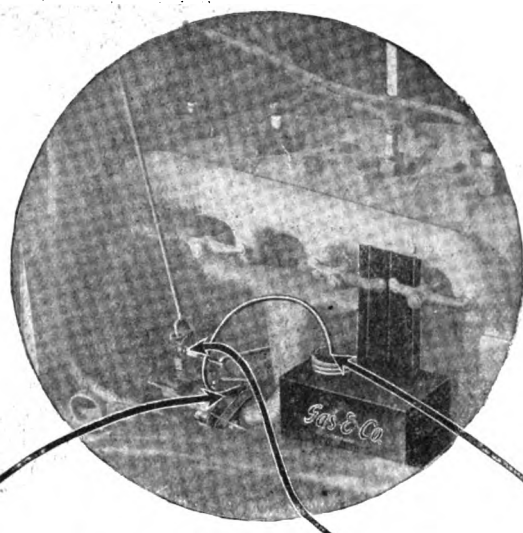
We also make Adamson Ford Brake Shoes, Lined and Unlined



Sell Adamson Repair Gum for best results with any Vulcanizer

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Totally Eliminates Carbon



COMFORT

1. THE NEEDLE VALVE CONTROL automatically reduces the consumption of gasoline in proportion to the demands on the engine and insures smooth running.

POWER

2. THE VAPORIZER is an auxiliary mixing chamber which automatically maintains the maximum efficiency of the gas at all engine speeds.

RELIABILITY

3. THE DECARBONIZER automatically supplies the engine with the moisture necessary to produce the maximum of power and to totally eliminate carbon.

THE GAS-E-CO SYSTEM for Ford cars automatically fulfills three functions, each one of which is vital to economy and smooth running.

Every movement of the gas lever at the steering wheel adjusts the Needle Valve. The Vaporizer thoroughly vaporizes the mixture and the Decarbonizer sends the proper moisture to the cylinders to ensure quick combustion and the ***Total Elimination of Carbon.***

There is always a fat spark on Gas-E-Co Equipped Ford cars because the spark plugs are always clean.

No mechanical skill is needed to install the Gas-E-Co System. Anyone can do it in 20 minutes with the tools in his kit. There are no holes to bore. There is no cutting to be done.

Price delivered by Parcel Post, $10, with full money-back guarantee. Write for interesting free booklet covering the subject of air mixture, vaporization, and decarbonization.

GASOLINE ECONOMY COMPANY

1103 Colonial Trust Building **Philadelphia, Pa.**

The Gas-E-Co System

for Ford cars increases mileage an average of 30%. It eliminates carbon. It reduces friction. It ensures a smooth-running engine. *It is automatic.*

Gas-E-Co COMPANY

We have an attractive proposition for dealers desiring to handle an article that is a wonderful good-will producer and that sells itself in any community where it has been introduced. Write for details concerning our introductory and permanent propositions.

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The MUNGER "Always Tight" expansion joint

MUNGER "Always Tight" Piston Rings

Increase the power of your engine!

Give it greater speed!

Make it smoother running.

Munger "Always Tight" Piston Rings will do all this for you by making your pistons *permanently* gas-tight.

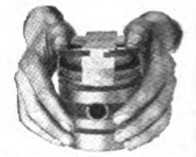
The patent method of peening these rings permits them to conform to the shape of the cylinder, and the Munger "Always Tight" Expansion Joint is a perpetual safeguard against gas wastage over, under or through them.

Anyone can install these rings without breakage. Slip them over the Munger Ring Insertion Tool and they slide into their grooves without the slightest trouble.

Each complete outfit includes one *overwidth* ring for each piston (to be used in worn grooves) and a Re-grooving Tool with which worn grooves can quickly be straightened without disconnecting the piston from the connecting rod—a saving of both time and money.



The Munger Re-grooving Tool in position for cutting. Testing width of groove with an overwidth ring



A Munger "Always Tight" Piston Ring being slipped over the Munger Ring Insertion Tool



Showing how easily Munger "Always Tight" Piston Rings can be placed in the piston grooves with the Munger Ring Insertion Tool

SPLITDORF ELECTRICAL CO.

NEWARK, NEW JERSEY

Splitdorf Branch Houses and Service Stations:

Atlanta ..... 10-12 E. Harris Street	Minneapolis ... 816 Hennepin Avenue
Boston ..... 68 Brookline Avenue	Newark ..... 278 Halsey Street
Chicago .. 2613 S. Michigan Avenue	New York ..... 7 West 61st Street
Dallas ..... 402 S. Ervay Street	Philadelphia ... 210 North 13th Street
Detroit ... 1295 Woodward Avenue	Pittsburgh .. 5943 Ellsworth Avenue
Kansas City .... 1827 Grand Avenue	San Francisco ..... 1022 Geary Street
Los Angeles ... 1275 S. Hope Street	Seattle ..... 1628 Broadway
Toronto ..... 469 Yonge Street	



The MUNGER "ALWAYS TIGHT" PISTON RING OUTFIT—

8 "Always Tight" Rings (Regular Size)
4 "Always Tight" Rings (Overwidth)
1 Regrooving Tool
1 Ring Insertion Tool

Accessory Dealers and Garage Men!

Any jobber will supply you with Munger "Always Tight" Piston Rings. Order them now!

List price for all sizes up to 3¾ in. diameter, $1.25 per ring.

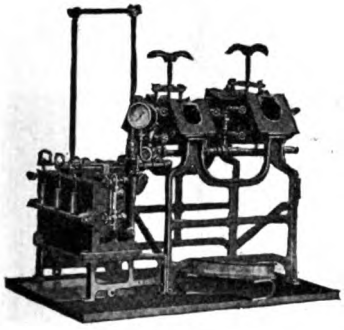
With each complete outfit of rings, a *Munger Piston Re-grooving Tool* and a *Munger Ring Insertion Tool* are supplied without extra charge.

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Akron-Williams

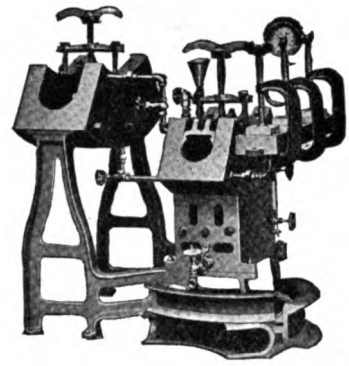
TIRE REPAIR EQUIPMENT

Used, Sold and Recommended by All Leading Tire Companies



EVERY Akron-Williams machine and tool has been invented, designed and perfected with the help of expert engineers from the leading tire companies; and the equipment we offer you is the same as used in over 100 tire factories and sold to tire Dealers all over the World.

With these outfits you do the most efficient work, by the latest and most approved methods. Buyers of Akron-Williams equipment get the benefit of the latest improvements and *get them first*.





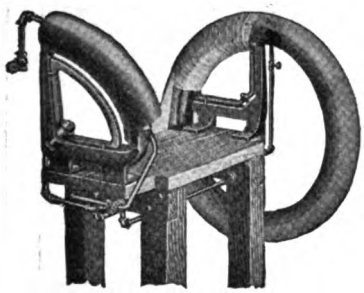
Most Complete Line

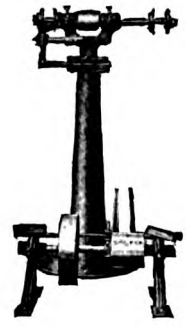
The Akron-Williams line includes every approved time-and-labor saving device for modern tire and tube repairing; there is an outfit for every size shop. No equipment is too large for us—no tools too small.



This Year—Repair Tires

The high price of tires has *doubled* tire repairing and created splendid opportunities for this line as an individual business or a department of your store or shop, Start Right—with an Akron-Williams outfit—and add equipment as your business increases.





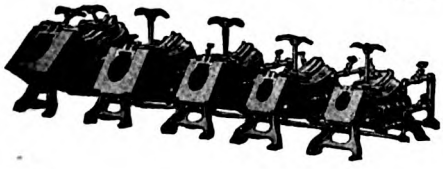
PROMPT SHIPMENTS

Send for New Catalog.

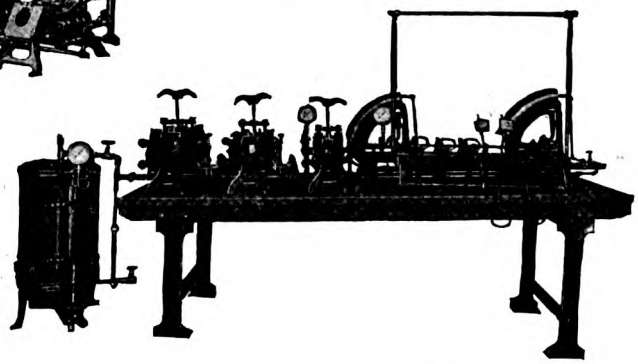
THE WILLIAMS FOUNDRY & MACHINE CO.

GLENDALE STREET AKRON, OHIO

Exclusive distributors for California:
THE WATERHOUSE & LESTER COMPANY
San Francisco, Oakland and Los Angeles.





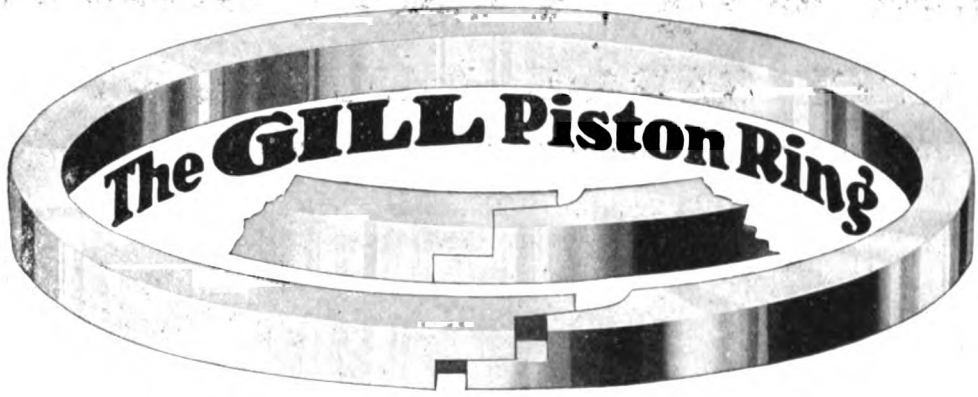


AKRON-WILLIAMS A-W "PRODUCTS"

AKRON-WILLIAMS A-W "PRODUCTS"

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PERFECT POWER FROM EACH PISTON



A ONE-PIECE PISTON RING

GILL PISTON RINGS are self fitting, ONE-Piece rings of sturdy construction. They have a distinctive joint which absolutely prevents the escape of compression, the formation of excessive carbon, or the pumping of oil into the combustion chamber.

ASK YOUR DEALER for GILL PISTON RINGS, or write us today.

GILL MANUFACTURING CO., 351 W. 59th St., Chicago, Ill.

DONT BUY UNTIL YOU SEE THE NEW YORK SECURITY SWITCH LOCK



FOR THE FORD CAR

A glance will tell you that it is BETTER MADE, simpler to install, gives greater protection and sells quicker than any other Switch Lock made.

A STRONG METAL HOUSING completely covers present switch. Note that screws and screw holes are *always covered by steel bars.*

When key is removed, entire Ignition System is grounded, baffling the most expert thief as wiring "around coils" or even applying separate battery avails him nothing.

Magneto, battery current, or both may be used just the same as before Switch Lock was applied.

It fits on either old style (moulded) or new style (all metal) Switch. Your present switch is not disturbed. Wires and attaching bolts remain just as they are at present.

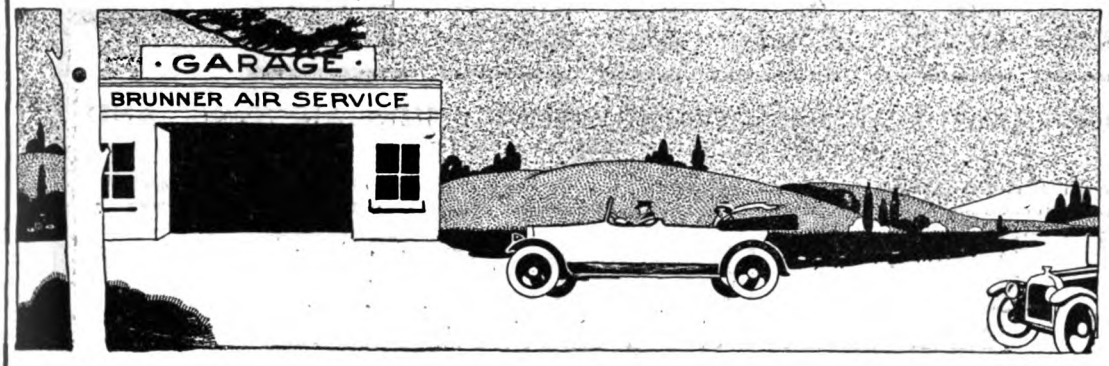
With these many super-features, the price is less than others—**$3.25** Complete.

DEALERS—This is the Switch Lock you will handle after receiving further particulars.

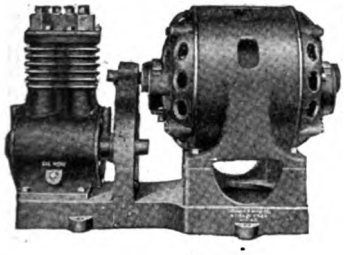
NEW YORK COIL COMPANY, 337-340 Pearl St., NEW YORK, N. Y.

Western Distributors:—GRAY-HEATH CO., 1440 Michigan Avenue, Chicago, Illinois

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In the Garage Business, Today, Reputations Are Built on Service, and the Very Foundation of Garage Service is a Dependable Air Compressor

INVESTIGATE THE BRUNNER AIR COMPRESSOR



Garagemen who investigate the air compressor field thoroughly before placing their order invariably select the Brunner because they find a predominance of Brunner Air Compressors in the successful neighboring garages and the users always gladly recommend the Brunner, which has rendered high-class service and helped them in building up their reputation.



Years of dependable and efficient service in the garage have built up an enviable reputation for the Brunner Air Compressor, which is being maintained by the continued dependability of Brunner Compressed Air Service.

Dependable Compressed Air Tanks and Fittings Are Just as Necessary as an Efficient Air Compressor



A leaky needle valve, tank or air hose will reduce the efficiency and shorten the life of a good air compressor as well as add to the operating cost—and an improperly constructed air tank, an inaccurate air gauge or an unreliable safety valve will render a compressed air plant absolutely dangerous.

Brunner Compressed Air Tanks and Fittings Are Both Safe and Reliable and will permanently increase the Efficiency of Any Imperfect Installation



A length or two of Brunner "Resistoil" Air Hose would permanently reduce this item of expense and convince any garageman that it is by far the best air hose obtainable.

Our new No. 15 Catalogue is the most complete and comprehensive book of its kind ever published. We will be glad to send you the catalogue and the name of the Brunner Jobber who covers your territory.



BRUNNER MANUFACTURING COMPANY

Main Office and Plant:
UTICA, N. Y.

Cincinnati Branch:
CINCINNATI, OHIO



"The Motorist Who is Brunnerwise—Knows Brunner Service Satisfies"

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Take the Air to the Tire

THE MOST HANDY AND PRACTICAL COMBINATION AIR TANK AND PUMP OUTFIT EVER MADE

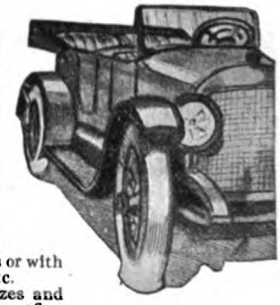
For Dealers, Private Garages and the Salesroom. For use on the instant—can be wheeled anywhere indoors or outside and takes up very little space. Equipped with automatic cutout and a No. 2 size



Portable Tank and Pump

LECTROFLATER
ELECTRIC AIR COMPRESSORS

NOTE THESE IMPORTANT FEATURES



No. 2 Lectroflater Electric Compressor; the quickest, most economical and most powerful electric compressor of its size in the world. Will compress sufficient air to inflate ten tires at a cost of one cent for current—one hundred tires for ten cents. Guaranteed to pump only cool, clean, dry air. Grease—not oil—lubricated. No oil level to maintain. Air cooled by enforced draught. No liquid to freeze or evaporate. All working parts self-contained under one housing. No exposed belting, shafts or gears.

All advanced improvements will be found in this outfit.

Will contain enough air to inflate ten tires from 40 to 80 pounds pressure without refilling. Finished in green and black enamel with nickel trimmings.

To install and operate pump merely attach electric cord connection to any electric light socket; that's all.

Furnished with husky metal wheels for hard service on cement floors or with rubber tires for use on hardwood or tile floors, sales rooms, show rooms, etc.

The Lectroflater line of air compressors includes pumps of many sizes and capacities and combination units of many different kinds, including curb outfits, portable or stationary tank and pump outfits—outfits for indoor or outdoor use, at prices that range from $65.00 up. Write today for descriptive literature, prices and complete catalogue.

Jobbers: Write for special sales proposition. Catalogue, electrotypes and mailing literature available.

THE BLACK & DECKER MFG. CO.

Makers of **B & D PORTABLE ELECTRIC DRILLS**

South Calvert Street BALTIMORE, MD., U. S. A.

Distributors in Canada: Northern Electric Company, Ltd., MONTREAL

English Distributor: R. A. Rothermal, 18 Poland Street, Great Marboro, LONDON, ENGLAND

THE NAME THAT HAS BUILT OUR BUSINESS IS NOW OUR BUSINESS NAME.

IN THE PRODUCTION OF

TOP & BODY EQUIPMENT

Victoria Tops
One-Man Tops
Winter Tops

Eastern Representatives for the Anchor Detachable Winter Top

Top and Body Hardware of Every Description

Bodies

THE MARK OF

COPPCO

Auto Equipment

DEPENDABLE QUALITY

Seat Covers that fit
Curtains
Tire Covers
Radiator Covers
Cushions
Top and Seat Cover Fabrics
Custom Body Work and Painting

THE NAME OF GEORGE W. COPP HAS BEEN A

GUARANTEE OF SATISFACTION

UNUSUAL FACILITIES FOR HANDLING QUANTITY ORDERS

George W. Copp Co., Inc., Formerly NEW YORK AUTO EQUIPMENT CO., Inc. Office and Factory, 351-355 West 52nd Street, **New York**

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Ford Service Doubled

BY

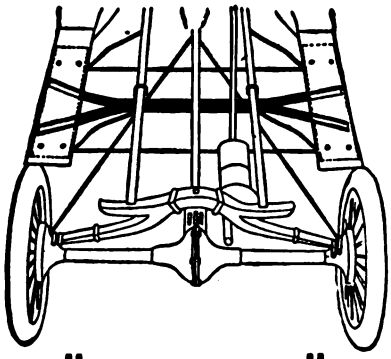
Presto

Body Brace and Running Board Support

For FORD CARS

Price in U. S. A. east of the Rocky Mountains $3.50 west of the Rocky Mountains $4.00

Price in Canada $6.00



Does away with fender, spring and running board breakage—holds drive shaft in place—eliminates side-swaying and makes entire frame of car more rigid and solid, increasing life of your Ford.

Simply constructed—can be attached by anyone. Car overhauling is now in process—your Ford owner is particularly anxious to get his car into first class order so as to be ready for the spring drive. Now is the time—be the first dealer in your city to handle the best Body Brace and Running Board Support on the market. Multiplies profits for you—complete satisfaction for your customers.

Presto Products Sell Quickly

Learn more of these rapid selling accessories—write now for complete catalog of 100 Presto Accessories of great merit.

METAL SPECIALTIES MFG. COMPANY

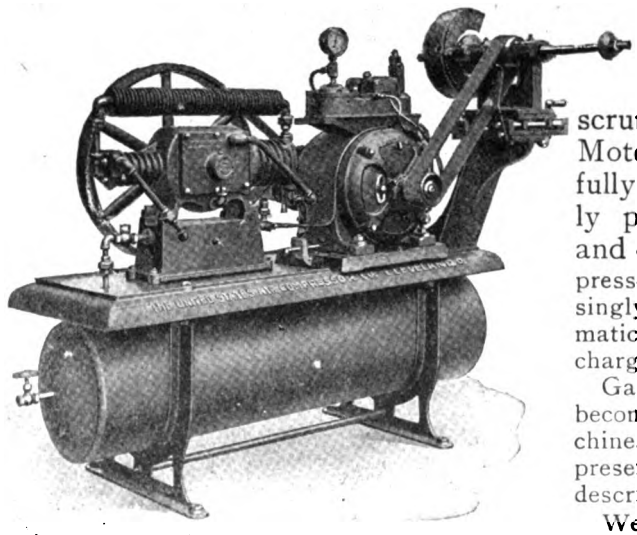
338-352 N. KEDZIE AVENUE CHICAGO, ILLINOIS

A Combined Compressor and Buffer or Grinder Head

GARAGES and tire shops may affect a considerable saving by purchasing this combination instead of two machines and two motors.

Maximum efficiency will be obtained from either unit and the saving made will include conservation of valuable space as well as a saving in first cost.

The De Luxe Two-Stage Automatic Air Compressor unit needs no introduction, having given unequalled success for several years. It incorporates many definite and valuable improvements and is to be found in a majority of the better garages throughout the country.



THE buffer or grinder head will likewise withstand close scrutiny by the best experts. Motor and compressor are fully enclosed and absolutely protected against dust and dirt from buffer Compressor or buffer can be operated singly or together while automatic controls prevent overcharging of tank.

Garage and tire men should become familiar with this machine, whether in the market at present or not, by getting our descriptive circular.

We also make a complete line of two-stage and single-stage compressors.

Send the Coupon for Descriptive Literature

The United States Air Compressor Co.

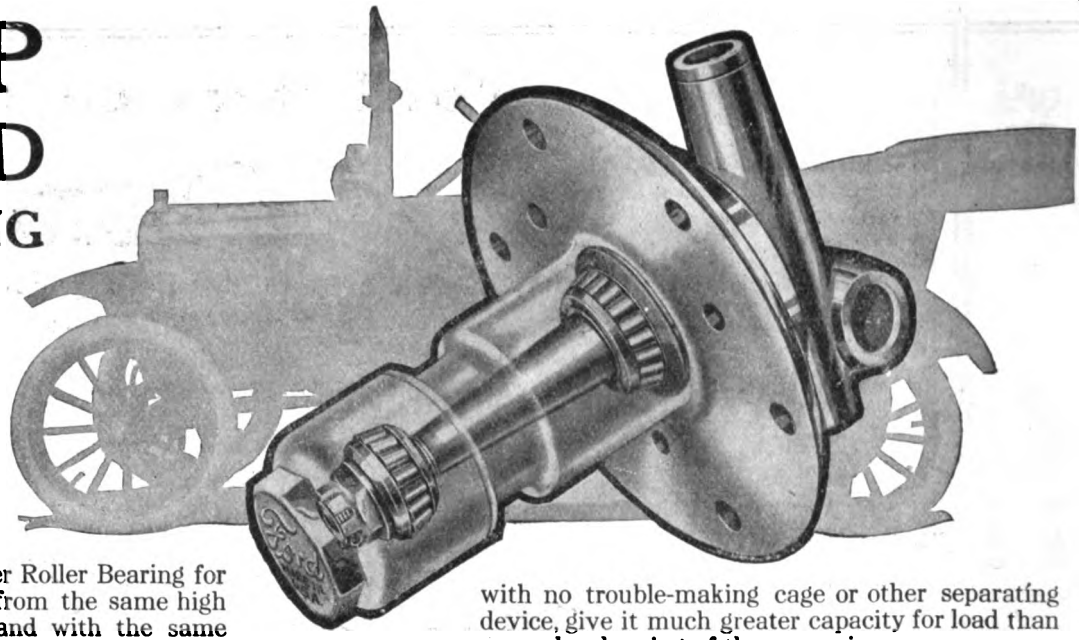
6536 Carnegie Avenue, Cleveland, O.

Please send Circular on New Combination Machines, also your new Catalog advertised in Automobile Dealer and Repairer to

NAME..... ADDRESS..... CITY.....

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STOP FORD BEARING TROUBLE



The Wright Taper Roller Bearing for Fords is made from the same high grade material and with the same care as the larger sizes made for heavy trucks and passenger cars. Its unique features of "Free Race and Full Series of Rolls" with no trouble-making cage or other separating device, give it much greater capacity for load than any other bearing of the same size.

Price, $10.00 Per Set
In Canada, $15.00

Fits Chevrolet 490 Also

Dealers should see their jobbers at once, or write us mentioning his name.

NATIONAL BEARINGS SERVICE CO.
WRIGHT TAPER ROLLER BEARINGS
Replacements for all Standard types of Bearings
725 N. BROAD STREET PHILADELPHIA, PA.



I EARNED $2200.00 IN FOUR MONTHS



THIS IS RICHARD A. OLDHAM

Mr. Oldham was telegraph operator for the Illinois Central Railroad for twenty years. He is fifty-eight years old. During all those twenty years he drew the customary monthly salary of a telegraph operator—no more—no less. One day he read one of my advertisements and the possibilities of making money in the Auto Tire Repair Business. In a few weeks he had purchased and installed a Haywood outfit, and was doing business for himself. He was **His Own Boss.** A short time ago he wrote us that his income in four months was as much as it had been in Two and One-Half years as Telegraph Operator. You men who have been left at home—who are beyond the draft age, can and must take up the burdens left behind by others. Oldham is a living example of what can be done. I have 500 places to be filled now. 500 stations where tire repairing is neglected, because there is no one to do it.

I Must Have 500 Men to fill these places within the next 60 days

I have a big interesting book to send you—a book about tires—it explains this business—gives inside figures and profit. Gives actual proof of success—letters of others who are now operating Haywood Shops and making big money. What these men have done you can do. $2500 to $4000 a year is conservative. One machine will give you a start. You can see all business around you—everywhere there are automobiles there are tires that need repairing. You know that. All you do is open a shop—put out a Haywood sign and auto owners will come to you, welcome you and the service you bring them.

Sign the coupon and mail it today, or send a post card or letter.

M. HAYWOOD, Pres.
HAYWOOD TIRE & EQUIPMENT CO.
528 Capitol Avenue, INDIANAPOLIS, IND.



M. HAYWOOD, Pres.
Haywood Tire & Equipment Co.,
523 Capitol Ave., Indianapolis, Ind.

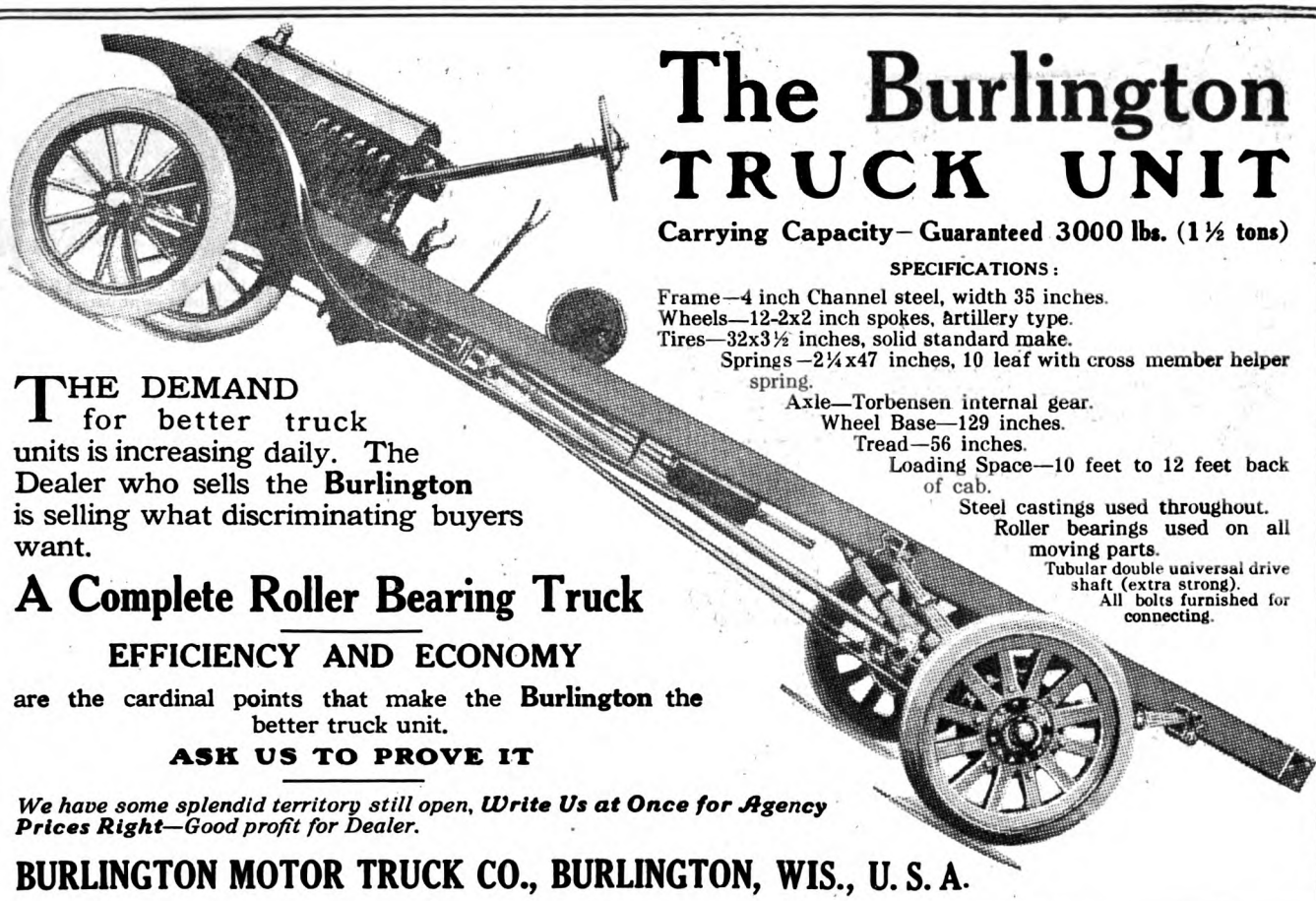
Dear Sir—Please send me your book on Haywood Tire Repair Plants and full particulars on your National Tire Repair Service and details of your FREE school of tire repairing.

Name.....

Address.....

.....

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The Burlington TRUCK UNIT

Carrying Capacity—Guaranteed 3000 lbs. (1½ tons)

SPECIFICATIONS:

Frame—4 inch Channel steel, width 35 inches.
Wheels—12-2x2 inch spokes, artillery type.
Tires—32x3½ inches, solid standard make.
Springs—2¼x47 inches, 10 leaf with cross member helper spring.
Axle—Torbensen internal gear.
Wheel Base—129 inches.
Tread—56 inches.
Loading Space—10 feet to 12 feet back of cab.
Steel castings used throughout.
Roller bearings used on all moving parts.
Tubular double universal drive shaft (extra strong).
All bolts furnished for connecting.

THE DEMAND for better truck units is increasing daily. The Dealer who sells the **Burlington** is selling what discriminating buyers want.

A Complete Roller Bearing Truck

EFFICIENCY AND ECONOMY

are the cardinal points that make the **Burlington** the better truck unit.

ASK US TO PROVE IT

We have some splendid territory still open, Write Us at Once for Agency Prices Right—Good profit for Dealer.

BURLINGTON MOTOR TRUCK CO., BURLINGTON, WIS., U. S. A.

GTD



For "Every Other Car"

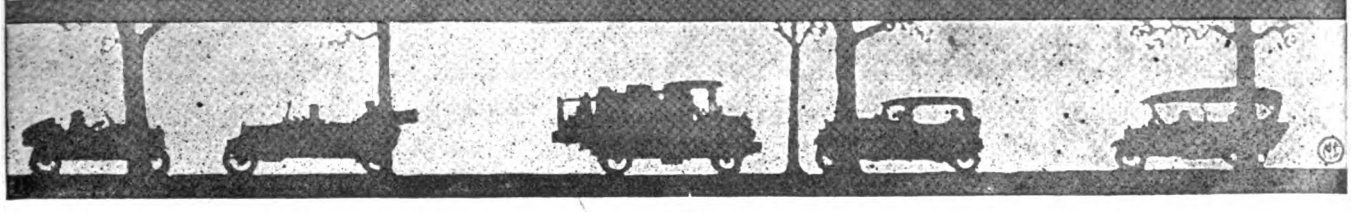
Here is a complete Automobile Screw Plate for Ford cars, consisting of Taps, Dies, Reamers, Stocks, Tap Wrenches fitted for the requirements of the Ford. It is called a Garage Repair Set, but is equally valuable to the dealer and car owner—in fact everyone who has occasion to care for a Ford car can use and needs this set. It is furnished in a well-made wooden box, handy for general use and to carry on the road to repair jobs.

As Ford led in standardized production of automobiles, so has G. T. D. led in the standardization of screw threads. This set consists of selected G. T. D. products to fit the Ford requirements. It is a sound investment, as proven by the large numbers sold and in use.

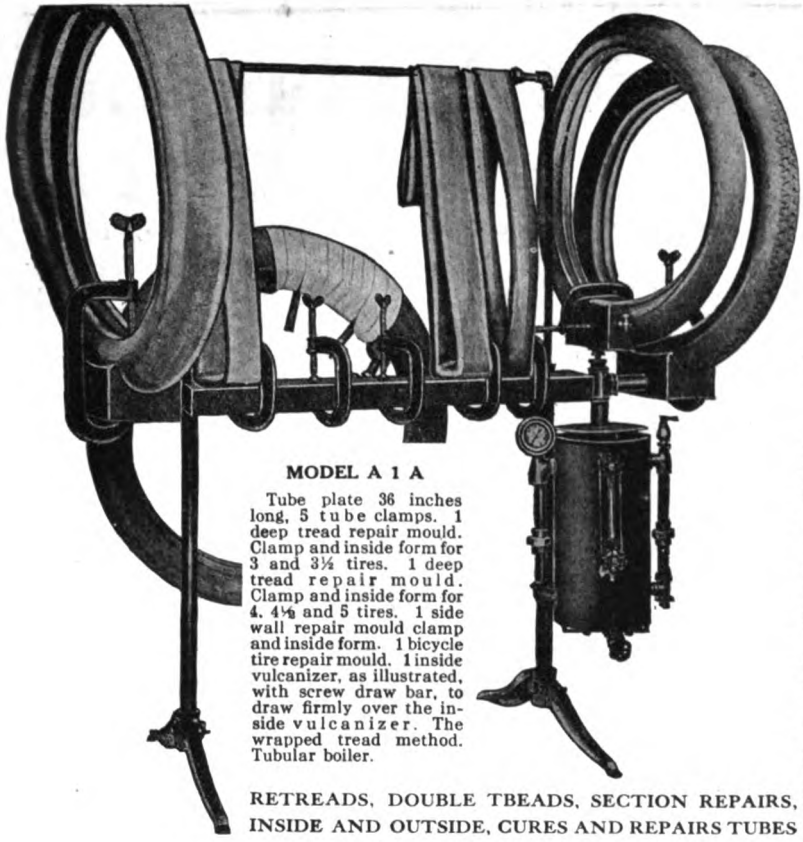
On sale by the best dealers—write us for particulars and booklet of Auto Tools.

GREENFIELD TAP & DIE CORPORATION

Greenfield, Massachusetts, U. S. A.



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MODEL A 1 A

Tube plate 36 inches long, 5 tube clamps. 1 deep tread repair mould. Clamp and inside form for 3 and 3½ tires. 1 deep tread repair mould. Clamp and inside form for 4, 4½ and 5 tires. 1 side wall repair mould clamp and inside form. 1 bicycle tire repair mould. 1 inside vulcanizer, as illustrated, with screw draw bar, to draw firmly over the inside vulcanizer. The wrapped tread method. Tubular boiler.

RETREADS, DOUBLE TBEADS, SECTION REPAIRS, INSIDE AND OUTSIDE, CURES AND REPAIRS TUBES

"First Month's Profits Paid for the Plant"

THAT'S WHAT ONE MAN WRITES

No Experience Necessary—We Teach You How!

THE VANDERPOOL VULCANIZERS

will get your share of the big Spring and Summer tire repairing. Order a Vanderpool Vulcanizer—don't put it off—you lose money every day you delay.

Get into this big profit-making business while work is plentiful—prices are good and everybody has more than they can do. Vanderpool Vulcanizers do the best—yes, the very best work, and that's the kind of work that satisfies customers and builds your success.

Operators of Vanderpool Vulcanizers are selling these machines for us right along—all the time. Ask for our list of users in the U. S. A., Canada, Cuba and South America. Write for the price list today and send this "ad" in with your letter. (A.D.&R.)



Vaderpool 5-Cavity and Retreading Molds with Bead Molds



Vanderpool 3 Cavity



Vanderpool 2-Cavity

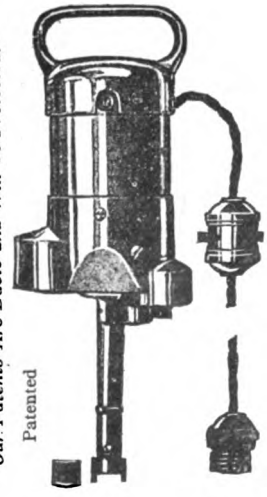
Start in Right Now—Don't Put it off a Minute Longer—Send for Catalog

VANDERPOOL COMPANY - SPRINGFIELD, OHIO

STENMAN ELECTRIC VALVE GRINDER

The STENMAN ELECTRIC VALVE GRINDER bears the same relation to hand grinding that the vacuum cleaner does to the old corn broom method of carpet cleaning. Once tried it is indispensable. Ten days' usage and it has paid for itself.

Mull that over a moment—Visualize it—Don't you sense the possibilities of what this device means to you?



Our Patents Are Basic and Will be Protected.

Patented

Repair Shop Profits Are Made on Labor

YOUR REPAIR SHOP REQUIRES IT EFFICIENCY CALLS FOR IT YOUR CASH DRAWER DEMANDS IT

The STENMAN will grind a set of eight valves in 20 minutes. Whereas, it takes two hours or more to grind them by hand. And we guarantee the Stenman to do a better and more even job. Also—that a novice can operate it.

Plugs in on any lamp socket—A. or D. current. Regular stock 110, 130 volts. Made for higher voltage where required.

After the most severe tests and tryouts had been made by their engineers, these Grinders have been bought and are in use by the U. S. Army, Naval, Aviation and Postal Departments. Also, by the U. S. Steel Corp., Standard Oil, Gulf Refining, Western Electric and many up-to-date garages and shops on the East.

The universal use of the STENMAN ELECTRIC VALVE GRINDER is limited only to our ability to supply them.

An Interesting Distributing Proposition to High Class Jobbers Where We Are Not Already Represented

The Stenman Electric Valve Grinder Co., Inc., 42 Southbridge St., Worcester, Mass.

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BULL DOG

(NEVER SLIP)

TIRE PATCH

STAYS ON FOR GOOD

It is a four-ply patch consisting of two plys of the best quality of raw red rubber, one ply of semi-cured rubber and fabric back, which adds to its strength and durability.



Makes a permanent repair for punctures and blow-outs at one-twentieth of their former cost.

SELF-VULCANIZING

Can be applied in three minutes, and no tools or heat required—BULL DOG holds forever.

ABSOLUTELY GUARANTEED

Our guarantee is the full retail price refunded if BULL DOG is not satisfactory if used according to the directions.

Insist on the genuine BULL DOG NEVER-SLIP TIRE PATCH. Accept no substitute.

Ask your dealer today; and, if he does not have BULL DOG, write us direct.

We also manufacture a high grade two-ply all rubber patch (no fabric) which we pack under the Bull Dog label.

Retails $1.00 and 50c.

Dealers, write for liberal offer.

IOWA TIRE PATCH COMPANY

Dept. A. DES MOINES, IOWA.



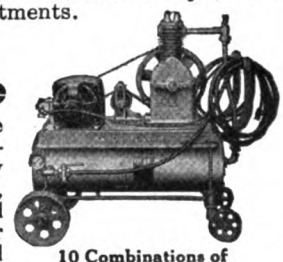


CURTIS AIR FREE FROM OIL

The Curtis Compressor is the only one designed to prevent flooding the cylinder with more oil than it needs for lubrication. This, because of our controlled-splash oiling system. No excess oil is forced into the air line. **Oil ruins tires**—air free from oil means fewer blowouts and increased mileage all around for your customers, with less tire adjustments to you. Make your place the most popular one in town. An easy and inexpensive way, is to install a Curtis Compressor. The customer assumes if you have the best free air service, you will have the best service in all departments.

Costs No More Than Ordinary Compressors—But Note The Difference

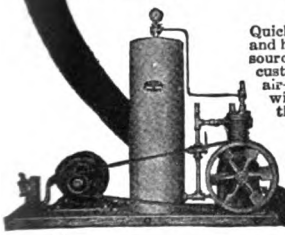
Live garages and service stations are using Curtis Air Compressors. Motorists expect free air service. Why not give them the best and win over new customers by supplying, not only reliable air service, but **Curtis Air—Free From Oil.** A poor air system which shoots oil into the tires, or which is unreliable, drives customers away. Thousands of Curtis Outfits are rendering daily, effective, efficient service all over the country. Your Curtis Compressor can further pay for itself by supplying air for air hoists, painting, cleaning, vulcanizing, blowing dust and drillings from tools, and many other things. Curtis Compressors are backed by manufacturers who have been specialists in this line for twenty-five years.



10 Combinations of Compressor and Tank Sizes—Any Current

Five Sizes—Tight Pulley Only, or Tight and Loose Pulley

11 Combinations of Compressor and Tank Sizes—Any Current



Makes New Customers—Holds Old Ones

Quickly pays for itself in bringing in new trade and holding the old trade, for it not only is the source of a dependable supply of air when your customers want it, but it also supplies clean, cool air—free from oil. Motorists realize that oil will quickly destroy their inner tubes, and, therefore, look for a station that supplies Curtis Air—Free From Oil.

Curtis Compressors are built to meet the requirements of your business in sizes, arrangements and prices. Send coupon at once for full information and attractive prices. It will pay you to investigate our proposition. *Write us today, or ask your jobber for prices—but insist on a Curtis.*

Curtis Pneumatic Machinery Co.

1530 Kienlen Avenue St. Louis, Mo.
530E Hudson Terminal, New York

Curtis Pneumatic Machinery Co.

1530 Kienlen Ave. St. Louis, Mo,

Gentlemen: Please send me full details regarding Curtis Garage Air Compressor—your proposition and low prices.

Name.....

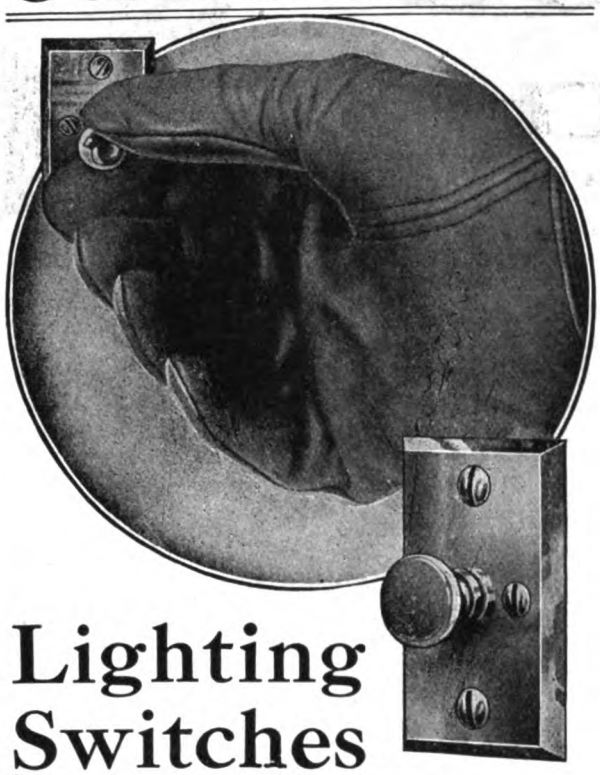
Address.....

Jobber's Name.....

Address.....

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CONNECTICUT



Lighting Switches

are the neatest, simplest and most easily installed equipment of their kind on the market.

Easily operated with a gauntleted hand.

Simple construction insures unending service and satisfaction.

Connecticut switches are designed to provide every arrangement of lighting control that can be desired.

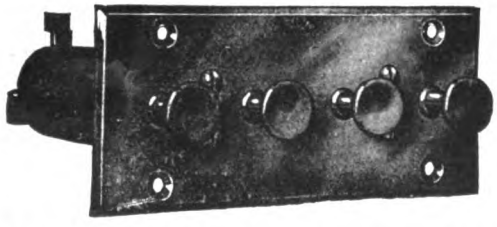
One switch for all lights, individual switches for each, or any choice of functions, individual or in combination.

HEADLIGHTS
The use of resistance for dimming the use of double filament bulbs, or the use of large or small bulbs.

HEAD, SIDE AND TAIL LIGHTS
Head and tail lamps on and off together. Side and tail lamps on and off together.

DASH LAMP
Individually or in conjunction with tail light. These are the principal functions of our standard switches but these by no means indicate the limits of control to which we are confined. Every practical arrangement has its switch.

Trade catalog illustrating and describing full line upon request



CONNECTICUT TELEPHONE & ELECTRIC COMPANY
Meriden, Conn.

IMPERIAL
WELDING CUTTING EQUIPMENT

Imperial Equipment a Daily Necessity To Auto Repair Men

Auto owners, intent on economy, will this year need more repair work for their cars than ever before. You can secure this extra business and handle it easily if you have Imperial Welding and Cutting Equipment on your floor.

First in Safety, Speed, Efficiency and Economy

A single operation often pays for its cost through the saving effected. Portable, it is always ready for use anywhere. Welds anything in metal and cuts wrought iron or steel.

Write today for our Free Catalog containing complete information regarding cost of operation, work done, saving effected, etc.

IMPERIAL BRASS MFG. CO.
520 S. Racine Ave. - Chicago, Ill.

THE BRECO CONVERTER

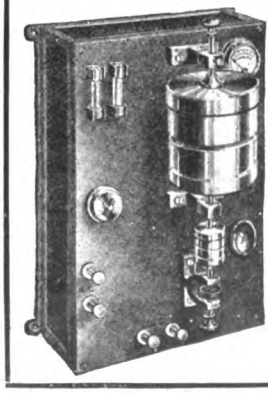


For charging batteries or for any other purpose where it is necessary to change A. C. to D. C., is *far superior.*

Highly Efficient, Economical, Rugged and Very Easy to Operate.

The new modern method, tested by years of everyday service. Endorsed by highest authorities.

PRICE $24.00 UP. SIZES, 1 BATTERY UP.



Battery charging becomes a very simple, inexpensive and mighty profitable matter, with the BRECO CHARGER.

Write for Catalogue No. 21

THE BRECO ELECTRIC CO.
206 Huron St., Toledo, O., U. S. A.

SOLE LICENCEES

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"NORMA"

PRECISION BALL BEARINGS

(PATENTED)

Unless your factor of safety is amply large throughout your machine—even in the so-called minor parts—your whole construction is weakened. Your ability to meet overload and emergency strains is limited by the resistance of the weakest part. The reserve strength of a car or truck is only that of its weakest part or accessory.

The proved service capacity of "NORMA" Speed Bearings—the high factor of bearing safety which they impart to an accessory in which they are used—explains why the makers of magnetos and lighting generators of proved dependability have standardized their product on "NORMA" Bearings.

Be Sure—See that Your Electrical Accessories are "NORMA" Equipped

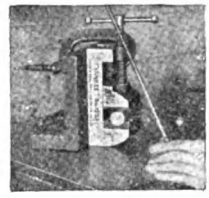
THE NORMA COMPANY OF AMERICA

1790 BROADWAY NEW YORK

Ball, Roller, Thrust and Combination Bearings.



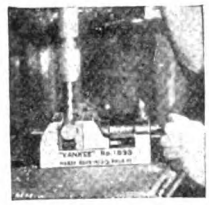




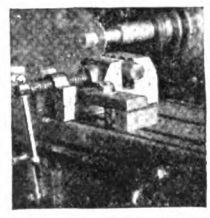
No 1—"YANKEE" Vise, set on service plate and holding steel cylinder for accurate center-marking.



No. 2—The centers, on the cylinder as above marked, being punched for drilling.



No. 3—"YANKEE" Vise, with work, removed from bench to drill press. Holes are drilled absolutely true.



No. 4—"YANKEE" Vise, still holding the work in original alignment, fastened to bed of milling machine.

Removable from Base For Continuous Work

You do not remove the work from the "YANKEE" Vise, but move the vise itself—for the various operations, on bench, drill-press or other machine.

So, you see, the "YANKEE" Vise is needed in every shop or garage, no matter how many other vises are there; wanted by every motor mechanic—because it works in ways and places impossible for other vises: Multiplying Man's Power!

The "YANKEE" Vise is machined square, for use on end or either side as well as upright. Provided with V-grooved steel block for holding round and irregular shapes.

As a time- and labor-saver—and better garage-service to patrons—this vise is in a class with the "YANKEE" Ratchet Breast and Hand Drills and "YANKEE" Automatic-feed Bench and Chain Drills.

"YANKEE" Vise

No. 1993, with Swivel Base

Price, $6.50

Body 7¼x2¾ (wide) by 3 inches. Hardened steel faced jaws; open 3⅛ inches. Vise held to base by set-screw. Camthrow lever locks position.

No. 993—"YANKEE" Vise without base—Price, $4.50

Your dealer can supply you

Write us for free "'YANKEE' Tool Book" of drilling, tapping, wood-boring, and screw driving tools especially needed in the garage or auto repair shop.

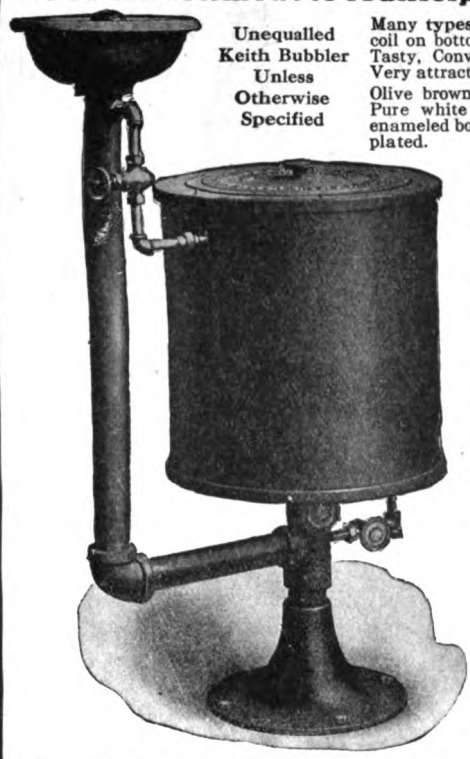
NORTH BROS. MFG. CO., Philadelphia

"YANKEE" TOOLS

Make Better Mechanics

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BUBBLING FOUNTAINS
For Attachment to Municipal Supply



Unequalled Keith Bubbler Unless Otherwise Specified

Many types and sizes—May have coil on bottom as well as on sides. Tasty, Convenient and Efficient. Very attractive appearance.

Olive brown baked enamel finish. Pure white vitreous cast iron enameled bowl. Fittings nickel-plated.

Wastes above or below the floor.

Our Lines Include:

Sanitary Wash Bowls (in Batteries), Bubbling Fountains (Plain and Ice Cooled), Metal Lockers, Metal Stock and Pattern Storage Racks, Metal Shelving, Metal Cabinets, Vault Fixtures, Soda Kettles (40 and 60 Gallons), Metal Stools and Chairs, Water Mixers, Work Benches, Bench Legs, Full Line of Plumbing Fixtures, Etc.

THE BEST IS THE CHEAPEST

Send for list of users. Many Thousand in use.

This cut shows our No. 604—75 lbs. of ice—cork insulation—15½ coils of ½" brass tubing No. 22 gage. Thorough workmanship—selected materials—tested and adopted by those whose judgment is unquestioned.

SEND FOR CATALOGUE

MANUFACTURING EQUIPMENT & ENGINEERING CO.
Shop and Factory Metal Equipment Outfitters
136 Federal Street, - - - Boston, Mass.
WORKS AND MAIL ADDRESS: Framingham, Mass.

Dearborn Universal Truck Units
Convert ANY Pleasure Car Into a Truck

DEALERS:
This Is Your Chance Now's the Time

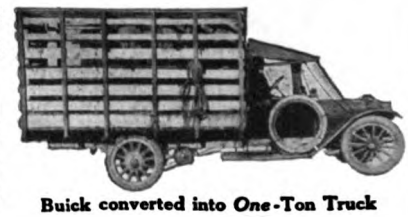
Dearborn Universal Truck Units transform ANY car into a substantial One or Two-Ton truck—and are the only ACTUALLY manufactured Units that will fit all makes of cars.

Any car converted into a truck by a Dearborn Universal Truck Unit is as strong and serviceable as a standard truck of similar capacity, yet the cost is only one-half as much.

The efficiency of Dearborn Universals is proven by the fact that they are now attached to over 65 different makes of cars and have been doing duty in most every line of work. Thousands of Dearborn Universals have been in active service over a year.

We want live dealers to take on this line. We are now alloting exclusive territory in localities that are not already under contract. Write or wire for particulars.

Dearborn Truck Co.
1252 S. Campbell Ave., Chicago



Buick converted into *One*-Ton Truck



Pratt-Elkhart converted into *Two*-Ton Truck



Packard converted into *Two*-Ton Truck



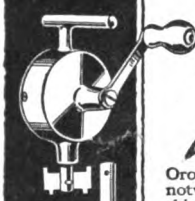
Cadillac converted into *Two*-Ton Truck

ACCESSORIES THAT LAST



ORO Automobile Accessories are built as well as we can make them. No labor or expense is spared to make each individual product live up to Oro traditions of quality and performance. That's why Oro Accessories last.





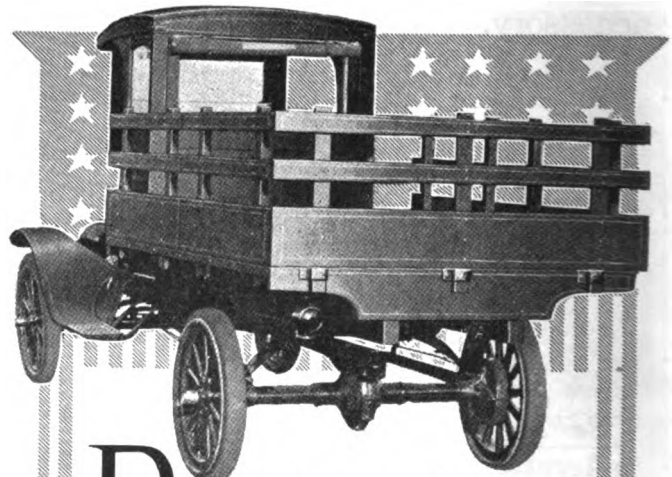
Oro

GOOD as GOLD

Oro Accessories cost no more than the ordinary kind, notwithstanding the better materials and workmanship that enter into their construction. A large output resulting from a big demand by appreciative customers reduces production costs. *For catalog and prices, address*

The Au-To Compressor Co.
Dept. 62 Wilmington, Ohio





Parry Bodies for Ford Chasses

PARRY MFG. CO.
INDIANAPOLIS, U. S.A.

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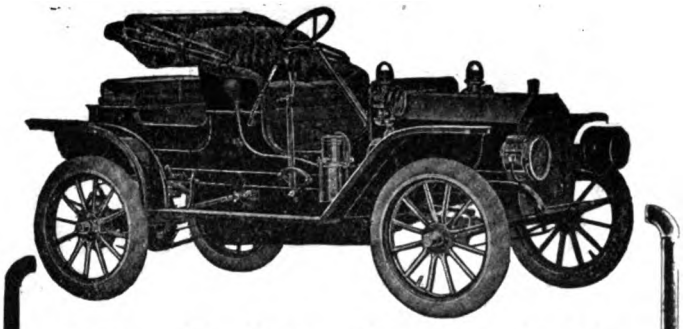
4000 MILES

If a tire fails to run 4,000 miles we will replace it with another tire for one-half the below price:

Size	Plain	Non-Skid	Tubes
30x3	$ 8.25	$ 9.00	$2.20
30x3½	10.25	11.25	2.40
32x3½	11.00	12.25	2.65
34x3½	12.25	13.45	2.80
31x4	14.75	16.25	3.10
32x4	15.00	16.60	3.25
33x4	15.75	17.35	3.40
34x4	16.50	17.85	3.75
34x4½	21.75	22.50	4.05
35x4½	22.50	23.30	4.15
36x4½	23.00	23.90	4.25
37x5	27.00	28.75	5.00

Express Prepaid on all orders If accompanied by check in full; otherwise 25 per cent deposit, balance C. O. D. Special proposition to dealers.

Broadway Tire & Rubber Co., Inc.
1777 Broadway, New York



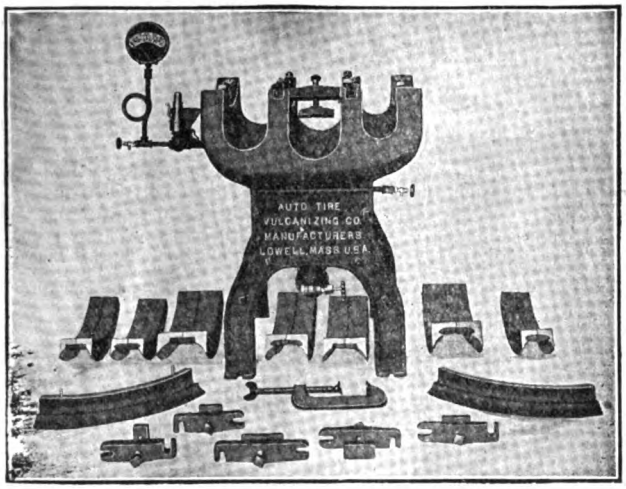
A Free Book for Auto Repair Men

The **Auto Repairers' Guide & Price Maker** is issued in the interest of automobile repairers, dealers and garage men—**it's free to the trade** and sent to them only.

Think of it, **512 pages of bargains**—about 3000 illustrations—a complete auto repairers' guide and price maker—quotes **lowest wholesale prices on** first quality automobile supplies, auto repairers' tools, tool kits, spark plugs, horns, lamps, pumps, springs, forgings, brass fittings, batteries, coils, switches, auto tops, Ford Specialties, and in fact **everything used on an auto.**

Write for your copy today, sending business card, letter head or some other evidence that you are in the trade

CRAY BROTHERS
JOBBERS AND MANUFACTURERS OF AUTO ACCESSORIES
1119-1123 W. 11th St., Cleveland, Ohio



Exceptionally Large Profits can be made by Repair and Garage Men with

No. 8 Lowell Adjustable Sectional Vulcanizer

It's different, superior, economical in operation, in fact beyond comparison.

Complete and thorough work can be accomplished with this vulcanizer at all times.

DON'T 'LOSE A MINUTE—WRITE TODAY!

Auto-Tire Vulcanizing Company,
140 Powell Street - - - Lowell, Mass.

THE PERFECT GEAR LUBRICANT



For Transmissions And Differentials

Evr-Lastin will not run in hottest weather—will not freeze in coldest weather—sticks to metal under the worst strains and pressure—preventing wear and assuring perfect lubrication.

Evr-Lastin TRADE MARK
GEAR COMPOUND
Less Required—Lasts Longer

It is only necessary to use one third the quantity of ***Evr-Lastin*** that you would oil or grease—and will last three or four times as long. Comes in 5, 10, 25 and 50-lb. tins—also in 225 and 400-lb. barrels.

FREE TO DEALERS With first order for half or full barrel of *Evr-Lastin*, we will send a self measuring 20-lb. grease cabinet free—pumps ¼-lb. to the stroke.

You will find ***Evr-Lastin*** a big money maker—write us today for prices and full particulars.

IMPERIAL OIL CO.
3140 Locust St. St. Louis, Mo.

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Signs of Wear

FRICTION pock marks are at first too tiny for the naked eye to see. Imperfect lubrication has permitted metal to metal contact. Roughened gear surfaces cause increased friction, gears get noisy and their destruction is rapid.

Put a stop to wear by using

TRADE MARK REGISTERED IN

NON-FLUID OIL

UNITED STATES PATENT OFFICE

It cushions gear teeth, preventing metal to metal contact and gives perfect lubrication all the time—never hardens with non-use or cold nor melts with heat. Use it on every gear and bearing in your car.

Get "KOO special" grade for gears; "KOOO" for bearings.

New York & New Jersey Lubricant Co.

165 BROADWAY NEW YORK

VULCANIZERS Complete Cure—One Heat **MILLER TIRES** Extra Ply—5,000 Miles

NEW 1918 MODEL "4 CAVITY" EN BLOC

Insulated Air-Cooled Flanges Prevent Marking Tires

Complete---Gas Burner

$150.00



One of the 60 Kinds in Style

From 90c up

We teach Tire Repairing FREE OF CHARGE at factory or by mail.

Extra Ply Tires

Give More Miles at Less Cost

"COG" & "Wrapped" Treads contain 25% more Fabric and Rubber than Standard.

More Fabric Means Less Blowouts—More Miles

New 80-Page Catalog on Request

Exclusive Tire Distributors are Repeating Sales

For Price-Lists—Repeat Sales System

WRITE DEPT. "H" CHAS. E. MILLER

ANDERSON, IND., U.S.A.

I AM PLEASING THOUSANDS AND I CAN PLEASE YOU!



OUR **Double-Service Tire is Two Standard Make** tires bound together so that each strengthens the other—so that the two will give **More than Double** the service that either one alone could give. This joining together of **Two A-No. 1 Tires** by our process makes a tire that has **Double the Strength, Double the Fabric** and **Rubber,** and **Double** the **Thickness and Protection** for the inner tube, against the accidents and mishaps of the road, makes it **Absolutely Puncture-Proof and Cut-Proof.**

Our **Double Service** Tires are giving upwards of 6,500 miles of wear and service to Automobile Owners all over the United States, and they will give YOU that too, and with added security from punctures and cuts of all kinds.

Make sure when ordering tires to state whether Q. D., Straight bead or Clincher type.

We carry a full line of New First and New Second Tires at a big saving. Write for prices, mentioning sizes. Prices upon request.

Terms: 10% Deposit, Balance C. O. D.

I. JAFFESS, Two Stores: 1319A Fifth Ave., 241 West 54th Street, **N. Y. CITY**

Air is Cheap Use Plenty of It



AIR pressure not only affects the duration of your tires, it also has a very direct bearing on how many miles per gallon your gasoline will give you.

When your tires are under-inflated, it takes more gasoline to drag them along the road—sometimes as much as 25% more. Measure your air pressure with a

Schrader

UNIVERSAL

Tire Pressure Gauge

and save not only your tires but your gas.

A. Schrader's Son, Inc.

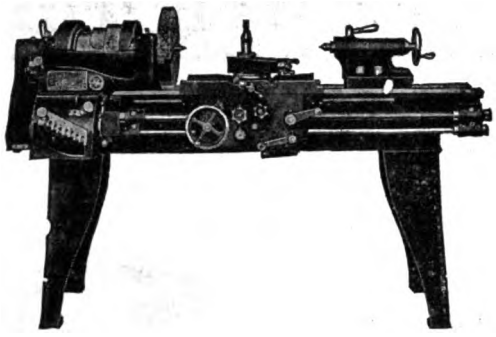
783-803 Atlantic Avenue

Brooklyn, N. Y.

London Chicago Toronto

$1.25

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14"x6' Monarch Lathe

Other Sizes, 16, 18, 20-Inch

Monarch Lathes are very accurate, rigidly constructed, modern in design and quick and easy to operate. They are recognized by the Automobile Repairmen as the best lathe for Garage use.

Monarch Lathes are low in price and within the reach of every garage owner. They are used in every class of work from the finest toolroom work to production work in the largest factories.

Furnished with taper attachment, milling, keyway cutting and gear cutting attachments, and other attachments useful in the Auto Repair Shop.

Send today for catalog No. 11 and prices

THE MONARCH MACHINE TOOL CO.
SIDNEY, OHIO

Make Your Old Top Look Like New

Many a fine-looking top is simply an old one refinished with

"F-S" "Evernew" Auto-Top Dressing

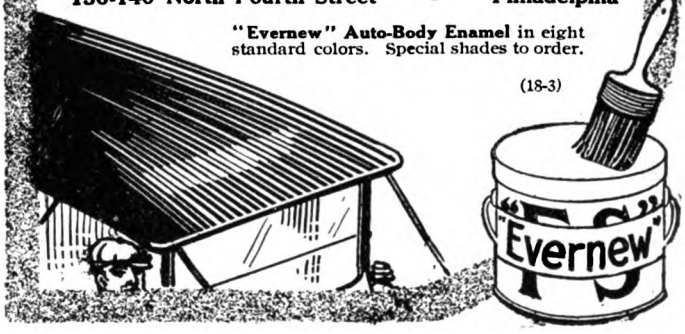
It is easily applied and dries quickly. Makes the top pliable and waterproof.

Write for prices

FELTON, SIBLEY & CO., Inc.
Mfrs. of Colors, Paints, Varnishes since 1863
136-140 North Fourth Street - Philadelphia

"Evernew" Auto-Body Enamel in eight standard colors. Special shades to order.

(18-3)



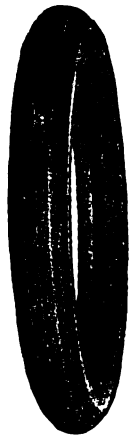
SECONDS

Firestone Super Cord

We know of no other tire with a record to surpass this—you all know that what is called a second at the Firestone factory anybody else would call a first—nothing really the matter with it—just a slight surface blemish or mould mark. We were very fortunate to get these splendid seconds—but you are luckier than we are because you gain more in prestige, miles and profit where we get only our regular margin.

Price List

Size	TRIPLE TREAD Our Price	TRIPLE TREAD List Price	F. F. TREAD Our Price	F. F. TREAD List Price
32 x 4	$23.93	$47.85	$25.70	$51.40
33 x 4	24.55	49.10	26.38	52.75
34 x 4	25.23	50.45	27.10	54.20
32 x 4½	26.95	53.90	28.93	57.85
33 x 4½	27.65	55.30	29.70	59.40
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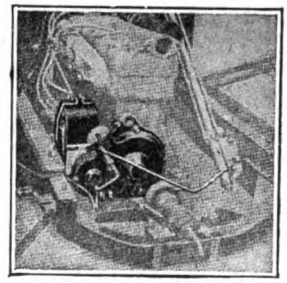
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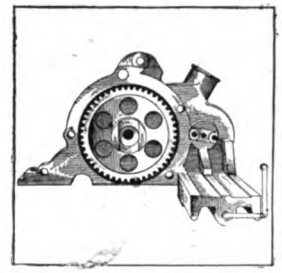
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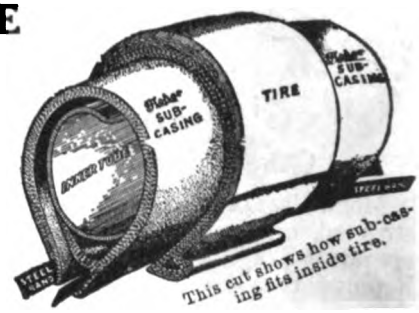
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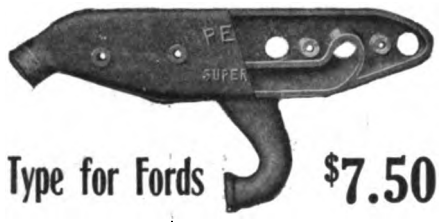
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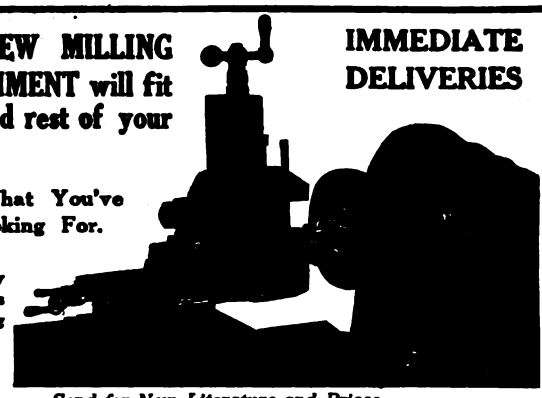
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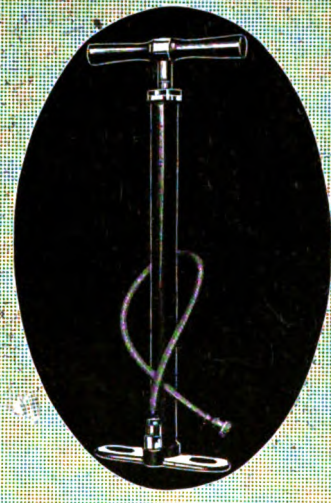
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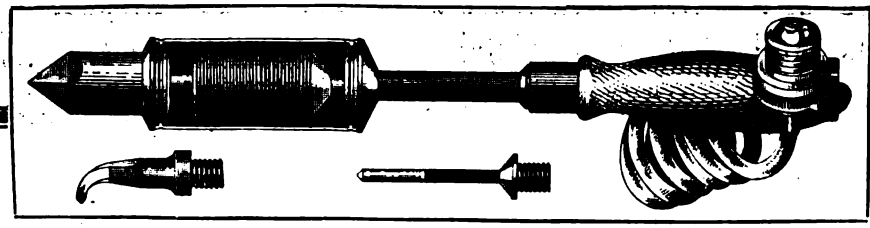
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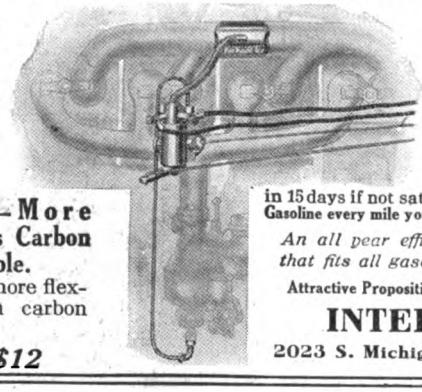
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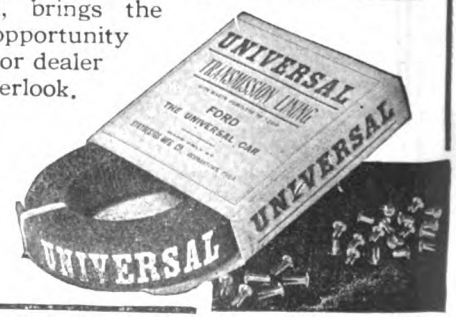
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A JOURNAL OF PRACTICAL MOTORING

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VOL. XXV. No. 3. NEW YORK, MAY, 1918. PRICE {10c. PER COPY / $1.00 PER YEAR



CARELESSNESS

In one of our large Eastern cities not long ago, a man jumped from the tenth story of an office building to the street. The sensational papers played rather strongly on the accident, which was witnessed by many thousands of people, and claimed it to be one of suicide. In all, perhaps there were 75,000 or 100,000 people who read the account of the accident and had a certain feeling of horror at this method of ending one's life.

Over 6,000 people in the United States commit suicide in just as direct a way as did this man. Six thousand four hundred and twenty-two people last year were killed by automobiles, the deaths in every case being directly traced to carelessness.

These are the figures that have been used by the Universal Film Manufacturing Company of New York in their film entitled "Careless America," which has been produced by the kindness of Mr. H. S. Firestone in his campaign against needless loss of property and life through carelessness. I speak of the number of deaths as being over 6,000. Approximately three times that number of people were injured and when one stops to think of it, this needless loss of life and maiming of people should be condemned by every person in the United States.

Hurry Everywhere.

An eminent French politician was once asked what his impression was of America, and he said that the one English word which came to his mind, best describing his impression, was the word "hurry." Everywhere he went, he said, he had that feeling of a person being out of breath. Everybody that he saw seemed to have their minds intent upon getting somewhere and getting there as quickly as possible, without respect to the feelings of their fellow men.

The old slogan of "Time is Money" is carried out in this country very literally, so literally, in fact, that thousands of people daily jeopardize their lives and their health simply to save a few seconds.

On the island of Long Island alone, last year, 109 automobilists speeded directly in front of railroad trains, despite all warning. Mr. Ralph Peters, the President of the Long Island Railroad, states that no less than 109 gates, which had been lowered because of approaching trains, were broken off last year by automobile drivers on Long Island. Which is the better word to describe such happenings as these? Shall we term them "accidents," or shall we term them "criminal negligence?"

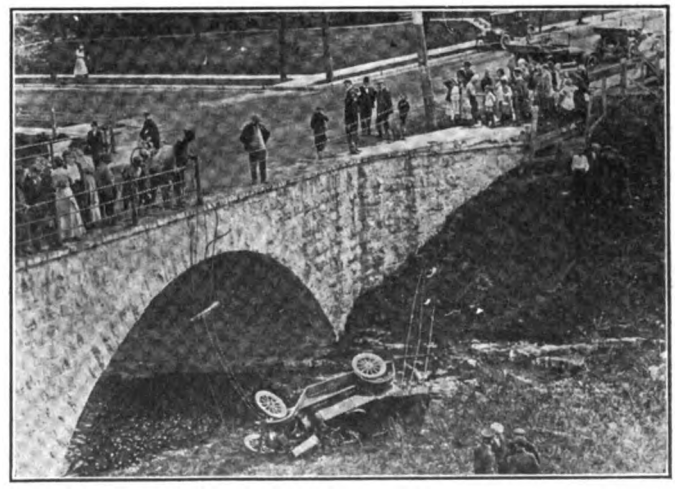
Not long ago I chanced to be near a place where an accident of this sort had happened. For over half a mile in each direction the track was in open view of the crossing. There were, perhaps, five machines a minute passing over the tracks at the point in question. At the time of the accident, five automobiles were drawn up at each side of the track waiting for the passing of a fast express train which could be seen in the distance.

A Bad Accident.

A small car driven at an excessive rate of speed passed the standing machines and ran directly on to the track in front of the approaching train. The driver of this car paid for his carelessness with his life, for the machine was hit squarely in the center and carried a distance of over 200 feet. Nothing was left in an unbroken condition except one front wheel. The rest of the machine had been reduced to a mass of bent iron and broken wood. Even the upholstery had been torn into shreds under the train wheels.

Strange as it may seem, one person survived with but a few minor injuries. Three others were killed. From the survivor it was learned that the driver knew the train was approaching and despite the warnings of the other passengers, he had tried to save a minute by cutting across the track. The party was out simply for the ride and had no reason for saving time; 369 deaths were caused in the United States last year through just this sort of carelessness.

The speed maniac is just as much of a menace to this country as tuberculosis. Upon his head rests the blood of many innocent people. Not only does he put his own life in danger at all times, but he

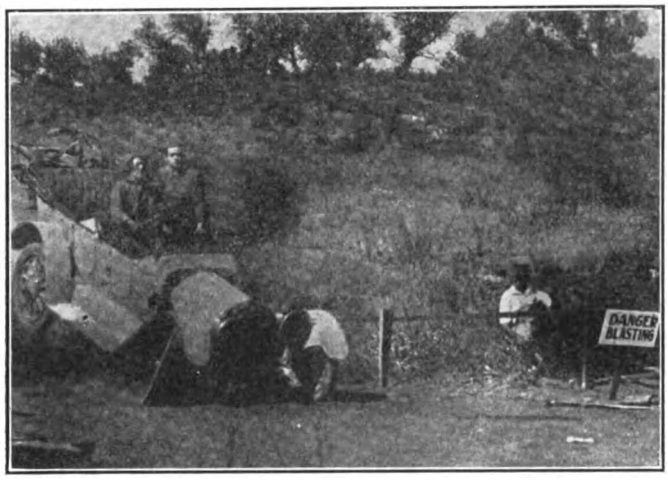


He Didn't Know the Road But That Didn't Prevent the Accident.

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is a menace to the community, and the existing laws cannot be made too severe for his punishment.

Two thousand people last year were killed directly through the results of accidents caused by overspeeding. The phrase "lost control of his car" is getting to be a common one. Practically all of the State laws are worded in such a way that, to lose control of the car, is a crime.



If You Drive an Automobile You Should Believe in Signs, Particularly That of "Road Closed."

Excessive Speed.

What does the phrase mean? In 99 cases out of 100 it means that the car is driven at too high a rate of speed. It does not mean that the steering mechanism is at fault or that the car is to blame; it means that the driver has lost his head through his own carelessness. "He did not know there was a curve in the road" or "he did not know there was an embankment ahead" has been said many times in the case of bad accidents. Granting that he did not know such a peril existed, was there any excuse for the accident? I answer emphatically "NO." If he had been travelling at a normal rate of speed, he would have been able to have stopped the car before going over the embankment, or running off the road at the curve. "Excessive speed" is the answer in practically every case of this sort.

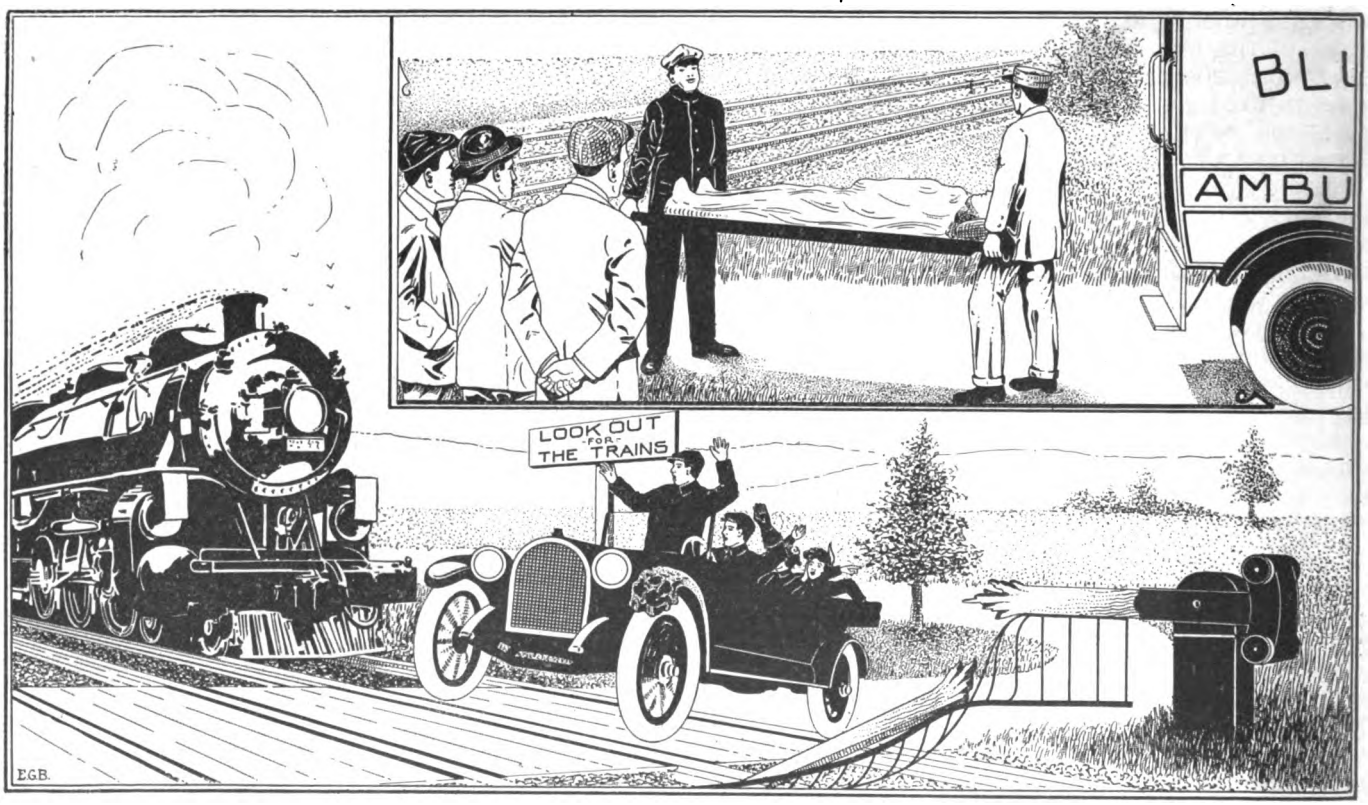
In the old days of horse-drawn vehicles, an accident of this sort was almost unheard of, unless the horse ran away, or the driver was intoxicated.

Only 103 deaths were caused in 1917 by defective brakes or steering gear, and I dare say that out of the 103 cases, 75 per cent. would not have occurred had the driver taken care of his automobile. A good driver not only keeps his automobile in condition, but never travels at such a rate of speed that his car is out of control, even should the brakes cease to hold or the steering gear become inoperative.

How many drivers are prone to ignore the sign "Road Closed for Repairs"? I will venture to say that a large percentage of the drivers smile at such a sign and pass it without a thought. The careless driver not only passes such a sign, but frequently does more than this. If the road has been fenced off, he is very apt to remove the fence in order to pass, and sooner or later he is bound to meet his fate. He may drive over an embankment, or he may get caught in a blast. At any rate, he is inexcusable.

He Didn't Know It Was Loaded.

This sort of a driver is in the same class with the man who drives in front of an oncoming locomotive, and has no one to blame but himself for his injuries. As in the former case, he often pays the price with his life. Such accidents as these are criminal and inexcusable and the driver figuratively jumps from the tenth story of a building. He is in the same class with the man who looked in the



On Long Island Alone, 109 Railroad Gates Were Broken by Careless Drivers.

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uzzle of a gun and did not know that it was loaded nd probably never will know that it was loaded.

There is another class of accidents which might e eliminated from the records, if it were not for ie pedestrian. To a certain extent the roads are ree, both to vehicles and to pedestrians, and there re a certain number of the latter who feel that they ave more right to the roads than the automobilist. wonder how many of these pedestrians would coun-



e Was in Such a Hurry That He Didn't Wait for the Draw Bridge to Close.

enance the driving of an automobile on a sidewalk? 'hey would probably be the first ones to raise a omplaint, while these same people cross the street rith no thought of vehicular traffic. Seven hundred nd four of these "jay walkers" were killed last year. 'erhaps many of them suffered because of the fact hat the automobile operators did not have their iachines under control. At the same time, however, ould not the accidents have been prevented by the edestrians, by exercising a little more care?

Not long ago I watched a man thread his way cross a congested street, while he was reading a ewspaper. He did not get hit; not that time, but if knew his name I feel confident that I would sooner r later find it in the death column of the newspaper.

Not all of the 704 deaths were the result of the edestrians reading newspapers, but they might all ave been avoided had the pedestrian exercised due recaution. Many accidents of this sort are caused y the desire to save time. Perhaps the pedestrian ins across the street in order to board a trolley ar. He wants to save a minute, and usually ends by sing considerably more than the minute.

Parents Are Often to Blame.

It is very strange that parents, who are themselves areful, do not instill this "safety first" idea in their ildren. Granting that "boys will be boys," a cer-in amount of training will instill in the boy's mind sense of personal safety. One hundred and twenty-x boys were killed because they stole rides on au-omobiles, trucks or trolley cars last year. We can-ot blame the boys for their deaths, but we can ame the parents, for it was their fault primarily. Two hundred and thirty-five children were killed while playing on the streets. The blame in this case also rests on the parents. The child is more or less of an imitator and, to a certain extent, he is very apt to court the danger element. If he sees his father cross the street in front of an automobile, he is very apt to discount the attendant danger, without realizing that his parent has a sense of proportion which he lacks. Without thinking of it, the father has computed distances in his mind, together with the speed of the approaching machine, and realizes that he can get across without endangering his life. Whereas the boy is probably too young to work out such a problem for himself, and at some time or other in imitating his father, the automobile may be just enough nearer so that he is unable to escape.

A motion picture has been evolved and produced by the Universal Film Manufacturing Company, the purpose of which is to eliminate many of the accidents caused by carelessness and will be shown throughout the United States during the coming year. It is entitled "Careless America" and is being distributed to moving picture houses without cost, due to the benevolence of Mr. H. S. Firestone. Three of the pictures used in illustrating this article are had by the kindness of the Universal Film Manufacturing Company.

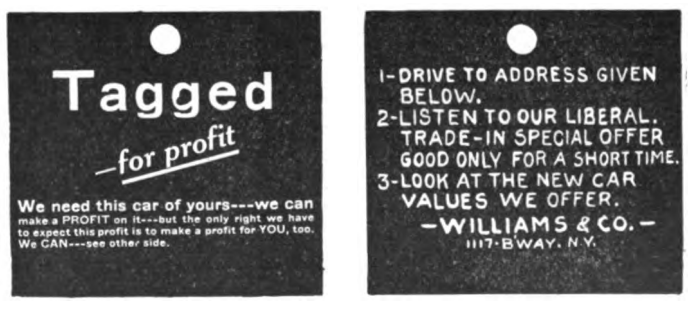
This motion picture will enable one to realize how much of the intense suffering could be avoided, how many hundreds of innocent people saved, if only the thought of "safety first" were not forgotten. All of our readers are urged to see this picture and to do their share towards the making of a more "Careful America."

A "TRADE-IN" CAMPAIGN THAT SOLD MANY NEW CARS.

BY CHILTON GANO.

An ingenious idea for a "trade-in" campaign, which could be used by any automobile dealer, was tried out recently on a big scale by an automobile manufacturer. The dealers of this manufacturer, in over sixty selected territories, followed the manufacturer's instructions, and the direct result was the sale, in the sixty odd territories, of over 1,000 new cars, or an average of about fifteen sales for each of the dealers. The campaign was not national in any sense, but was merely a single local campaign multiplied by sixty.

Of course, the sale, which does not involve the trading in of an old car, is the most desirable kind, but when the fact is admitted that probably over 65 per cent of all sales of new cars involve an allowance



The Face and Back of the Tag Put On Used Cars.

on an old car, why should a dealer not face the fact and make the best of it? That was the line of reasoning that led to the adoption of the plan in ques-

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tion. It was designed to go direct after "trade-in" customers, and to do it in such a way that the cars offered in trade would be the most desirable second-hand cars as opposed to comparatively worthless ones.

Tagging Cars.

Tagging of cars along the curbs was the first step in the campaign. The tag shown herewith, about the size of a postcard, and a bright orange in color, was provided to dealers by the manufacturer. The dealers' salesmen went along the streets and tied the tags to the steering wheels of the especially desirable used cars. Only three or four cars were tagged in even the most congested blocks. The tags thus complimented as well as interested the car owners, who were quick to observe that cars on either side of them had not been tagged.

The tag alone was merely the introduction to the campaign, which began immediately after the tagging in newspapers and by means of letters. A series of six special newspaper advertisements were used in each territory, 125 lines by four columns in size. "Blank Trade-In Sale Begins Tomorrow," announced the first. "The chance of a lifetime to trade in your old car!" Etc.

Simultaneously, a series of letters to car-owner prospects were sent out on the dealers' letterheads. Four different series of letters were provided by the manufacturer, the first for owners of tagged cars, the second for owners of small cars, the third for general prospects, and the fourth for owners of Blank cars.

The tagged-car feature was the strongest, and the follow-up to owners of tagged cars is of special interest in that it made a no-cash-down offer. This letter began: "Dear Mr. Jones: We tagged your car because we want it. We want to buy a few used cars like yours, in good condition; and right now, while we have a demand for these used cars, we are willing to make you a good proposition on your car in exchange for a new one, if you will come in and see us during our trade-in sale."

Among the copy arguments used were, that new cars are due to advance in price right along, that a lively demand for good used cars made liberal allowances possible, that there might be a shortage of supply by spring, and that the new Blank models were superior in every way.

Dealers were also provided with special four-page illustrated letters to prospects on which their own letterheads could be imprinted. These illustrated the new Blank models and were such as almost any dealer can secure from his manufacturer on request.

Original ideas nearly always pay in advertising, because they catch the consumer's interest. This tagging idea paid in every territory in which it was tried, both in bringing about trade-in sales and also attracting purchasers who wanted to buy used cars. The campaign emphasized to such purchasers that the dealer so advertising had exceptionally good values in used cars to offer.

The company's branch manager in Kansas City, for example, reported sales in his territory as 266 per cent. better than he had figured in advance would result, and used car sales as having increased 25 per cent. during the two weeks of the sale.

A Visit To A Busy Louisiana Repair Shop

A Few Helpful and Interesting Points Gained From Original Methods Used By An Up-To-Date Southern Garageman

BY JAMES F. HOBART, M. E.

"Getting the car ready so that you can take a ride in it?" the writer recently asked of a mechanic who was finishing the repair work on a good looking "———— eight" chassis.

"Well, I should hope not," replied the mechanic, as he tried another piston ring into one of the cylinders. "I sure don't ever want to ride in this car after it leaves this shop! You see, I'm fitting up this chassis for an ambulance, and that's the reason why I don't want a ride in it after the car is finished."

"It would be strange, wouldn't it," the mechanic continued, "if I should really be the first man to ride in the new ambulance? Well, I hope I don't though!" Some different, this, from Mr. Patrick Duffen, who used to be an "old rounder" ten years ago at South Bend, Ind. One day the city put out a brand new auto patrol wagon which whizzed past Pat, who then and there went to the nearest saloon and got "roaring" drunk in order that he might have the very first ride in the new "hurry-up" wagon. And he got it, too!

Front Window Overhauling.

The car noted above, which was being changed over into an ambulance, was made to do a bit of very effective advertising. Instead of having the work done, as is usual, in an obscure corner of the back shop, where it is usually dark at all times, the overhauling was done right in the big front window with two or three high grade cars standing around.

The room had a fine wood floor of hardwood, well polished and cared for. Shallow pans were placed underneath each show-car, and in this way the floor was always kept clean and free from even a sign of a grease puddle. A section of wide linoleum had been spread out at the front of the show window, the chassis placed upon the linoleum, and then blocked up with the wheels removed. The blocks were high ones, about two feet, so that easy access could be had underneath the car and at the same time the high blocking made it much easier to work at the engine, the high blocking making much tiresome stooping unnecessary.

A Fine Display.

All the large parts, after removal from their places, were cleaned and then spread out on the oilcloth under the car frame, where the parts made a very attractive display; many people stopped outside to look matters over, and many came inside to give closer attention to the work which was being done.

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The young man who was doing the work took especial pains to be very attentive and agreeable to people who came inside, and he even went out of his way a bit to give information to people who were interested but who seemed to feel that the young man would not like to have his time taken up answering questions.

The owner of the garage told the young mechanic to spend all the time necessary in answering questions and to giving all the information possible, and even to be patient with the "fool questions" which are so often "fired" at the garage man.

The parts of the mechanism, being laid in orderly arrangement on the oil-cloth under the machine, formed a setting to the work of the mechanic which can hardly be realized by anyone until they have tried the same thing and estimated the great value of the attraction, in an advertising way, which is invariably given to any window display of an operative character.

Probably the parts of the dismantled car might have remained spread out in the show window for weeks and months without attracting more than mere passing attention from a few people. On the other hand, the mechanic might have overhauled the car right there in that window without attracting even passing attention, had there been a lot of dirty pieces of mechanism scattered around in any old fashion, with dirty wipe-rags here and there, and perhaps with the mechanic wearing overalls which would have shamed a chimney sweep.

Everything Clean and In Order.

But everything was kept clean, there was not a particle of loose dirt or grease to be seen anywhere. The parts of the mechanism had all been cleaned before they were placed beneath the car frame, and the mechanic wore overalls which were clean all but for the "working dirt," which soiled them in places. That is, the overalls and jacket were not worn until grease and dirt would actually drop from them when they were shaken.

Fitting Piston Rings.

As the writer stepped into the garage, to have a closer look at the display above mentioned, the mechanic was fitting a new set of piston rings and had the set hanging upon a hook as shown at E, Fig. 2, one end of the hook, D, being slipped into a convenient hole in the top of the frame, C.

The axle, A, had been blocked up, as stated above, the large square block, B, preventing any possible

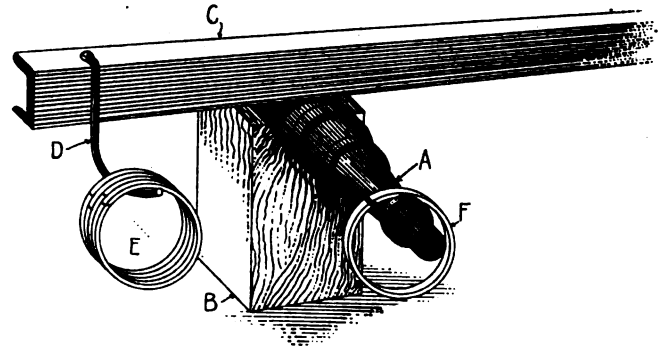


Fig. 2.—How the Piston Rings Were Kept Conveniently Handy While the Work Was Being Done.

tipping over of the frame no matter what work might be in process. The mechanic had a box upon which he sat while at work filing the rings so they would go inside of the cylinders.

He did the work of filing while seated upon the box, in comfort, the ring which was to be fitted being placed upon axle, A, as shown at F. The cut in the ring, being spread apart a bit by the fingers of the left hand, a thin, flat file was placed between the ends of the ring and one end worked off, care being taken to prevent all "rocking" of the file and to keep it square and true against the bevel of the ring at all times.

The rings, being "oversize," like all new rings, had to be filed in the bevel or cut, until the ring would lie inside of a cylinder without showing any gap between the ends and without the least side-lapping of the ends of the ring. The tests for these things were made with one of the thin steel tools, sold at any hardware store or tool supply house, the tool consisting of a bunch of thin, hardened pieces of steel of varying thicknesses attached to a handle something like a bunch of knife blades, but so fixed that any one of the thin steel pieces might be "opened" from the handle.

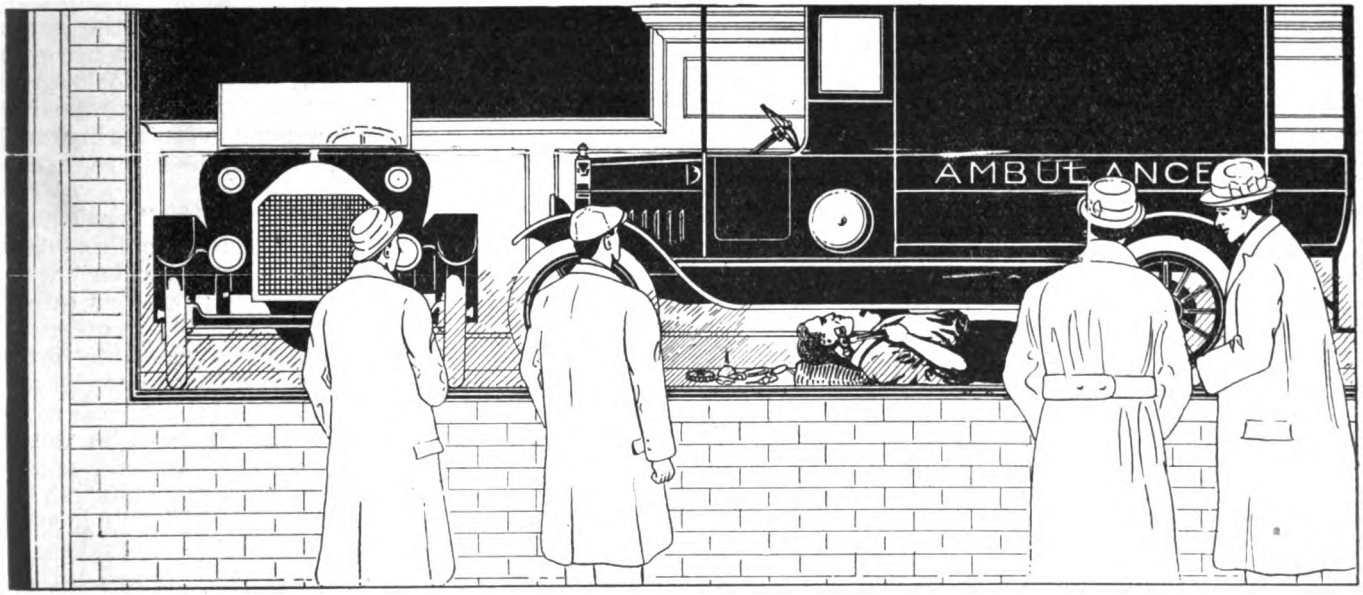


Fig. 1.—A Machine Was Repaired in the Front Window of the Garage and Proved a Unique Idea; Interested Spectators Were Always in Evidence and They Often Went Inside.

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With one of the very thinnest pieces, the mechanic would "explore" the cut between the ends of a ring after he had filed them a bit. For the test, the ring would be slipped squarely into the cylinder in which it was intended to be ultimately placed, squared with the face or end of the cylinder and then one of the thin test strips thrust between the ends of the ring

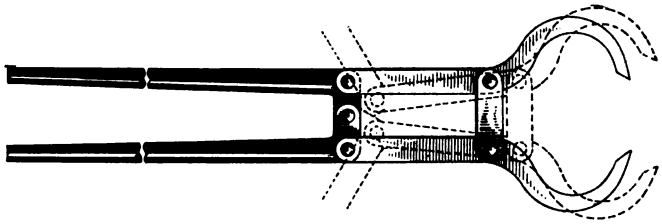


Fig. 3.—A Handy Quick Acting Spring Leaf Spreader Designed By the Garageman.

to determine if they were actually in contact, whether they fitted entirely along the filed ends, or whether the ring was offset sidewise.

The steel strip was also used along the side of the piston ring to determine whether or not there was a side offset. The steel strip, acting as a straight edge, would show with great exactness the least offset of the ends of the ring, upon finding which a little more filing would be done to the ends of the ring, which was returned to the "filing station" upon the axle as shown by Fig. 2 for the purpose of a little more reduction in length.

Using Chains in Louisiana.

It might seem queer that there should be a demand for chains in Louisiana, where it snows only "once in a dog's age," still there is a great demand there for chains, on account of the exceedingly slippery condition of some of the streets at certain times. Frequently a fog rolls in from the Gulf of Mexico—or somewhere else—which seems to cover everything which it touches with a slippery slime.

When the big "ballast" paving blocks, so much in use in some of the Gulf cities, become well coated with this slippery fog, automobile wheels will spin around like teetotums, and chains are in demand at once. If regular chains are not at hand, some car drivers will raid the nearest hardware store and bring out all kinds of chains, even to "log" chains with links made of steel half an inch in diameter.

A Log Chain on One Wheel Only.

Sometimes, the writer notices, a driver is not at all careful about putting on a pair of chains, but will slip one around one power wheel, then go ahead, letting the one chain grip the road as best it may, while the other wheel slips and slides around a good deal.

In Memphis, Tenn., during the ten inches of snow which came with the blizzard just after Thanksgiving day, many automobiles were seen running with a single log chain wound around the rim and tire of one wheel, no chain at all being placed on the opposite wheel.

Before doing a thing of this kind, which should be tolerated only in case of dire necessity, the car driver should study the action and behavior of a car in deep snow, with a heavy chain on one power wheel only. In a case of this kind there always must be a considerable amount of slipping of the wheel which has no chain, therefore, the differential must have a good deal of hard work thrown upon it, work which will wear it out in a very short time, faster than legitimate wear could do if there were a chain on each power wheel.

Parked Car Repairs.

For some time the writer has been watching with a good deal of interest a certain young man who operates a garage and repair shop:—"For Anything and Everything, but for Automobiles Mostly." Having recently opened the repair shop, business was not built up to suit him, and he cast about for ways and means whereby he might increase the number of his customers.

Near his garage was a church and a small park, around both of which business men were in the habit of parking their cars during office hours. When business was slack in the shop, the young man would visit the cars which had been parked, look them over carefully, and make note of anything that he found which needed repair or attention.

He would take occasion to be "Johnny on the spot" when the owners of said cars arrived in the morning or departed at night, and then and there the young garage owner would present his card and tell the car owner about the things he had noted; offering to make the necessary repairs, whenever possible, to the car while it was parked or if actually necessary to take the car to the shop and return same in time for the owner to go home with it at night.

The amount of business which the young man worked up in this manner was quite large, far more than he expected, and he now keeps two mechanics, who spend nearly all their time around town among the parked cars looking for business, and getting business, too!

After a while the business developed to the point where some means had to be found for ascertaining quickly the ownership of a car which was found to need attention, and the garage man sent out his men to take the license number of each and every car found parked within a radius of his shop in which he expected to operate.

Then, with hundreds of license numbers, means were taken to determine the names and addresses of the owners of said cars, after which the business became very easy. Whenever a car was found, the springs of which required oil, the top fixed up a bit, tires changed or fitted with new treads, the garage man, upon receiving from his man the license number and requirements of any car, would look up the owner and over the 'phone would make a proposition which usually met with a very encouraging reply and led to business in the immediate future, even if not at once.

A good deal of the "Parking Work" secured by this garage man is the oiling of automobile springs. For this work he has provided a "spreader" which may quickly be applied to a spring, and as quickly operated and removed after the oiling operation. Some "spreaders" are made to be operated by means of a screw, which forces knife edges or wedges between the spring leaves, but this kind of a tool proved not rapid enough for our man, who worked up one, as shown in Fig. 3, which applied the spreading pressure by means of a lever, somewhat similar to the action of a pair of tongs or a double-leverage bolt cutter same as is used by carriage makers for snipping off the ends of tire bolts and small carriage bolts.

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The oil-grease was used and was contained in a small "grease gun," by means of which a very thin "wire" of grease could be squeezed through the long, slender spout of the "gun" and deposited right in the middle of a spring leaf.

After applying the "spreader" and before the grease was squeezed out, the garage man would clean the spring leaves as well as possible with a small brush which he carried for that purpose, then the grease was placed directly upon cleaned surfaces.

A Traveling Service Truck.

It was soon found expedient to add a service truck to the business and to rig up a compressed air outfit which was permanently located in the truck. This outfit consisted of a small belt driven, air-cooled, air compressor, to which was belted a small gasoline engine.

The garage man has promised himself that "some day" he will place both engine and compressor on the same base and arrange them direct connected so as to do away with the nuisance of the belt drive between engine and compressor.

Some one does actually build direct connected outfits of this character, for the writer has seen at least one such machine at work. Believe it was in a garage in Newark, N. J., some time in the early part of 1917, but the writer was unable to ascertain who manufactured such machines, as even the owner and user of the machine in question did not know its pedigree or where it came from originally. Said he, "Done just bought it with a lot of other junk and stuff."

The garage man who started the "Parking" business above noted submits that he is seriously considering the making up of a large service vehicle, taking a good used "Jitney" for that purpose, in which there will be room for a pretty complete automobile repair outfit, and inside of which a whole lot of work could be done during inclement weather, when open air "parking repairs" are at a decided discount.

Setting Cotter Pins and Tightening Nuts.

Quite a bit of the revenue derived from "parking work" comes from giving a car a general overhauling as regards nuts and cotter pins and the filling of hubs and other receptacles with grease. It is claimed that vaseline makes a mighty good grease for the ball bearings in wheel hubs, and the frequent removal of the wheels from the front axle, the cleaning out of the ball bearings and the introduction of new vaseline adds to the profit of the parking garage worker and to the life of the car.

When tightening the nuts of a car, this mechanic says he always makes it a point to observe the direction of a hole before starting to tighten its nut, then he can always bring the castle nut right for the pin without having to stop and hunt for the pin hole!

"I always like," he continued, "to tighten all the nuts, then to go over the car again to set the cotter pins, for then I am sure that none have been missed, something one never can be sure of when a nut is tightened here and a pin inserted there, with no definite system of doing the work. When I first tighten all the nuts, then go around again and insert the pins, I know that none will be likely to be overlooked, for I have nothing but the cotter pins to think of and I get them all."

DIRT IN GASOLINE.

In Preventing Dirt From Reaching the Carburetor the Motorist Is Often Saved Both Time and Patience.

The automobilist, who has owned a car any length of time, realizes that there are a great number of small annoyances constantly cropping out which tend to reduce the pleasures of motoring. Not the least among these is the trouble caused by dirt or water in the fuel. Impurities in gasoline are seldom blamable to the gasoline manufacture, for they usually find their way into the fuel after it has reached the car or in the funnels of the gasoline salesman.

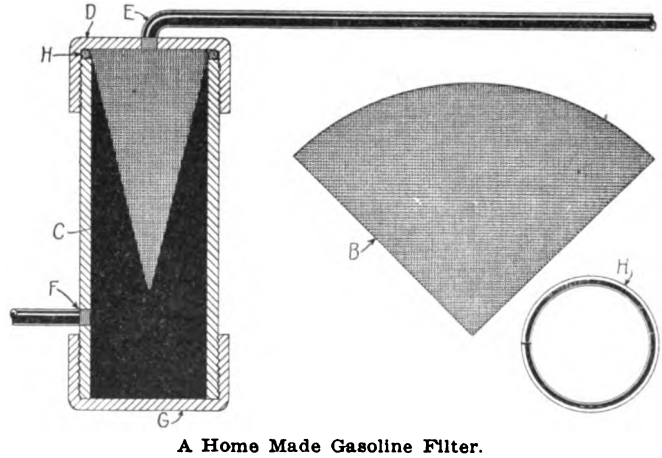
No matter who is to blame, the annoyance is there just the same, and oftentimes one sees a motorist stopped beside the road with the carburetor removed from the car for cleaning. This is one case where prevention is better than cure. It saves much time and annoyance, and the motorist can make very easily a device, such as illustrated herewith, that will prevent any dirt or water from entering the carburetor.

A Gasoline Filter.

Obtain a 1¼-inch brass pipe nipple, four inches long, together with two pipe caps, one of which should be tapped for ⅛-inch brass pipe, make up a ring of copper wire just small enough so that it will slip into one of the pipe caps, and cut a circular piece of very fine copper mesh, as shown at B. A paper pattern should be made first, by rolling the paper inside the ring into a cornucopia shape, as shown at C.

When the size has been obtained, the mesh may be cut and rolled into the shape, as at C. This cornucopia mesh should be soldered to the capper ring H and placed in the pipe cap D, which should be screwed into place on the nipple, using plenty of orange shellac on the joint to prevent leakage. The second pipe cap G should then be put into place, and the pipe nipple tapped for a ⅛-inch type at F slightly above the edge of the pipe cap. F may then be connected with the gasoline line, and E connected with the carburetor.

In passing from F to E all of the gasoline is



A Home Made Gasoline Filter.

filtered by the cornucopia mesh C, and both dirt and water fall to the bottom and may be removed by unscrewing the cap G. For a slight additional expense the pipe cap G may be fitted with a valve for draining.

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Recent Legal Decisions of Interest

Novel Automobile Fire Insurance Point.

A., in a deal for buying a new automobile, had left his old car with B. under a contract for its sale by B. at not less than $1,060, any excess above that sum to be divided between them. While in B.'s possession the old car was burned, and A collected $1,990 insurance.

In an action for one-half the difference between $1,060 and $1,990, B.'s petition alleged that A., by agreement, held the insurance policy as trustee for himself and B., each to have the same proportionate interest in the proceeds that he would have had in the proceeds of the sale of the car under the selling agreement. It was held, Waverley Sales Co. vs. Ford, 194 S. W. 1085, that this was a sufficient statement to render admissible evidence of an oral contract as to the keeping up of insurance at the joint expense of the parties for their joint benefit. The original selling agreement would not, of itself, entitle B. to any part of the proceeds of the insurance above the fixed sum of $1,060.

Scope of Chauffeur's Employment.

In an action against the owner of an automobile for damages, for the death of plaintiff's son in a collision between the wagon on which he was riding and the defendant's automobile, it appeared that the defendant's chauffeur took the car to a garage for repairs and afterwards, in company with an acquaintance, left on a pleasure trip in a direction away from the owner's garage, stopping at one or two places for drinks. On the way home he collided with the wagon. The Pennsylvania Supreme Court, Solomon v. Commonwealth Trust Co., 100 Atl. 534, held the owner not liable.

Collision—Effect of Settlement by Insurer.

An automobile owner was insured against loss, arising from claims for damages on account of bodily injuries growing out of accidents occurring while his policy was in force. He had a collision with the driver of another automobile, which was clearly caused by the latter's negligence. Nevertheless the latter threatened to sue the insured, and the insured's adjuster settled with the party at fault for $200. The insured sued the party at fault for damages. It was held, Burnham v. Williams (Mo.), 194 S. W. 751, that the settlement, which the insured had no hand in, he being forbidden by his contract to interfere with negotiations for settlement of claims, did not bind him and stop him from asserting claim for damages to his automobile against the party at fault.

Collision Between Automobiles—Driver's Duty.

The Connecticut Supreme Court of Errors holds, Wing v. Eginton, 102 Atl. 655, that in an action for injuries in an automobile collision, an instruction that, if the defendant saw that the automobile in which the plaintiff was riding as a passenger was on the wrong side and in a dangerous position, and the defendant could, in the exercise of reasonable care, have turned out further and avoided injury, it was his duty to do so, and that the question was only one of discretion.

Authority of Garage Night Watchman to Hire Car.

A motor company's night watchman, who had no authority to hire cars for it or employ chauffeurs, let out the car of another, which car, with his consent, was stored in the company's garage, and employed a chauffeur for the owner. The Kentucky Court of Appeals holds, Spradlin v. Wright Motorcar Co., 199 S. W. 1087, that the motor company was not liable for the death of the hirer due to the chauffeur's negligence or the defective condition of the car. Any person may keep his machine in a garage and hire or authorize its hiring to anybody he pleases, and when he does so and engages a chauffeur to run it, the owners of the garage are not to be held liable for what may happen on account of the negligence of the chauffeur or the defective condition of the car merely because the machine was kept in their garage, or because one of their employees, who had no authority to let out machines for them, but who was authorized so to do by the owner of the machine hired, engaged for him a chauffeur to run the car.

In and about every garage of any size there are many cars not owned or controlled by the garage people, and to hold them liable for everything that an unauthorized employee of theirs might do as the servant of some one else would unreasonably extend the limits generally applied in holding principals responsible for the acts of their agents or masters responsible for the acts of their servants.

Result of Boy's Interference with Brake.

A chauffeur set the brake of his employer's car and left it standing at a curb on a down grade. A boy rattled the brake, releasing it, so that the car started down grade, striking a person, who sued the employer. The Pennsylvania Supreme Court held, Rhad v. Duquesne Light Co., 100 Atl. 262, that the boy's interference was the cause of the injury, so that the defendant, even if negligent, was not liable.

Automobile Insurance—New or Second-hand Car.

In an action on an automobile policy of insurance against theft, it appeared that the plaintiff's employer purchased the car and delivered it to the plaintiff, title remaining in the employer until it was paid for. The New Jersey Court of Errors and Appeals holds that the car was new and not second-hand when title to it was acquired by the plaintiff, and so loss by theft was within the policy, which was based on an application stating the car was new; the purchase by the employer being as much for the plaintiff as if credit had been directly given to him by the seller.

Driver's Duty When Temporarily Blinded by Lights.

The New Jersey Supreme Court holds, Hammond v. Morrison, 100 Atl. 154, that a motorist who is temporarily blinded by the reflection of lights on his wind shield should stop his machine, and is guilty of negligence in proceeding blindly, and hence is liable where he ran blindly into a trolley car, catching the conductor, who was on the ground adjusting the trolley, between the machine and the trolley car.

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How to Place and Distribute Advertising So That It Will Give Results

2—The Kind of Advertising To Use In Order To Bring the Best Results And Enable You To Get the Most For Your Money, Should Be Considered

BY FRANK FARRINGTON

When you have decided that advertising will help your business, the next thing is to decide what kind of advertising will help it the most—for the least investment. I don't mean that you are to try to find the way of getting out of it with the least possible expense, but you want to find the way of getting the most for your money.

What kind of advertising will pay you the best return dollar for dollar of investment? The answer to that question is the foundation of your business success.

Newspaper Advertising.

There are no kinds of advertising by which you can reach as many people as many times for a specified sum of money as by newspaper advertising. Setting aside the case of the comparatively small or neighborhood garage in the large city, the local newspapers offer the means of getting your message to the public with the least trouble and with the least expense possible.

The city garage that is small cannot afford to use the big city daily because the rate is too high. It is based on the total number of readers, and so large a proportion of those readers are not possible patrons that the waste circulation makes that paper out of the question as a medium.

The newspaper goes out regularly. All you have to do is to take your advertisement to its office and the rest is done for you. With most other forms of advertising you have to do the work as well as pay the bill.

People expect to find advertising in the newspaper, and they look for it there. The man who does not advertise in the newspapers rarely gets credit for doing any advertising. With the exception mentioned above, the newspaper is the first place to begin to advertise. Other forms of advertising may be taken up when you get the newspaper space working properly, but the newspaper is your one best bet.

Newspaper Not Always Practical.

Of course not all newspapers are profitable mediums, and in every town where more than one paper is issued there is a best paper. Sometimes in a town supporting three or more papers there will be one which comes so near to covering the class of people you want to reach that it is not necessary to consider using any of the other papers. In other towns it will require the use of two papers to cover the population. It is rarely necessary, or even desirable, to use more than two papers, and when this is done, if they are daily papers, you can get practically the two paper influence at the one paper cost by using them on alternate days duplicating only at such times as you feel that your advertising is particularly important.

If you are in business in a town that has only weekly papers, no daily, you will probably want to use all of the papers unless there may be one that is obviously without circulation or influence.

The newspaper that has a bad reputation, like the garage that has a bad reputation, will not have a good class of patrons. It will not go to a good class of people, and it will not have the right kind of an influence with the people who do read it. In the same way, if you allow your advertising to go into a paper that prints all kinds of fake advertising, including lots of patent medicine stuff and get-rich-quick offers, mail order advertising and the like, you will be in poor company and you may be judged by the company your advertising keeps.

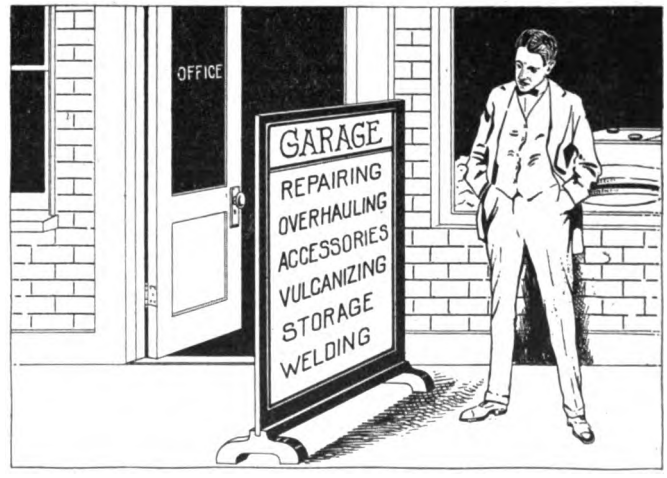
In addition to the newspaper advertising, there are various forms of advertising you will want to use because they are inexpensive and helpful, while it may be desirable to take up more intensive publicity plans after you get the newspaper advertising running smoothly and efficiently.

The other available forms of publicity include signs outside of the store, on the windows, or shades, or anywhere they may be used to advantage. Signs, after the initial cost is paid, cost nothing.

Bulletin boards have their uses, not only such bulletin space as you may have around the store, but such space as you can rent around town.

And right along the same line as bulletins and posters, are fence signs for use in the surrounding country; sign boards pointing the way and giving the distance to your garage, also guide-posts bearing your advertisement, and painted signs on roadside space—rocks, barns, fences, etc.

The distribution of printed matter to visitors in the garage and from house to house or in parked cars



Be Sure That the Passing Traffic is Informed as to What Can Be Done In Your Shop.

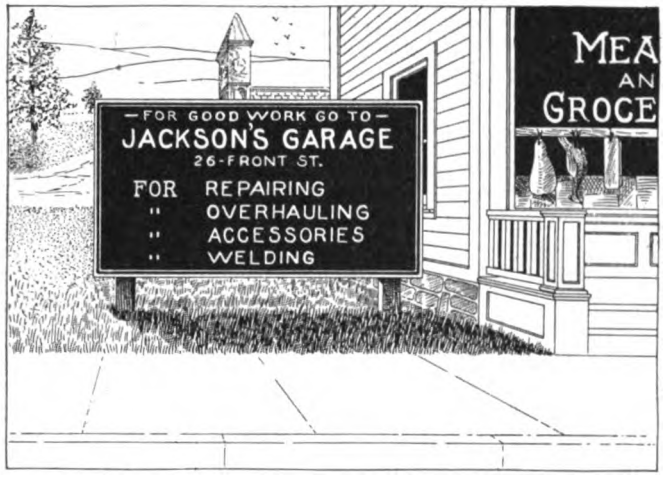
is worth consideration, and this will be discussed more particularly when a little further on we get to the subject of manufacturers' advertising helps.

The most important form of advertising, next to newspaper advertising, is no doubt the direct-by-

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mail kind, the advertising you send to prospects and possible prospects.

It costs a good deal for postage on such advertising, especially if sent under letter postage, but it is



A Signboard Near a Grocery Store Will Be Seen; For Meats and Groceries Are Necessities.

worth something to get a direct personal message into the hands of a man who may be considering spending some money for the kind of supplies or service you have to sell.

Your mail advertising may be merely printed matter supplied by a manufacturer or it may be actual hand-written personal letters, or it may be and probably will be somewhere between the two extremes. At all events it can be made to produce business if it is well handled, and it needs the detailed consideration we shall give the subject in this series of articles.

It is easy to see, then, that there are plenty of ways in which you can advertise if you will, and as far as expense goes you can choose a method the cost of which is adapted to your circumstances.

Seasons Affect the Business.

Various classes of business which are affected by the seasons or which are brisk only during certain months of the year, as is the case with the automobile business, especially in the north, convey the impression that advertising in the dull season may not be necessary. The garage man may feel that for him to advertise in January and February in a state where the ground is deep with snow at that time is a waste of money.

There should be no "off-months" in garage advertising, and if that is the case it will be found that the business will keep up much better while winter lasts. When people ought to be having their cars overhauled instead of waiting till spring to have it done, they will be the more likely to think of it and to appreciate the advantage of it, if they are being constantly impressed with the fact by good advertising along that line.

After all, there is just one good time to advertise your business and that is—all the time. Get your advertising going right away and keep it going. There will be seasons when you have more to sell, when there is more business to be had, and at such times you may want to do considerable extra advertising, but there will be no times when you can afford to cut the advertising down to such a stage that it will have no influence.

It is important that you keep the element of freshness uppermost in your mind in writing or in getting up any sort of advertising. You have seen advertisements for Christmas goods left standing until spring, and it is not so uncommon to see somebody's advertisement of hammocks or lawn mowers still eating its head off in the newspaper after snow flies. It looks just about as much out of place and just as shiftless, too, as it does to see the hammock left hanging on the front porch all winter, or to see the lawn mower standing in the yard beside the discarded Christmas tree, along in January.

People will not read old advertisements in the paper. Your advertisement is not as interesting to the public as a news item, and yet you know no one would think of reading over again and again, week after week, the same old news item or the same story.

Every time the paper comes out, see that your space is occupied by a fresh advertisement. There is nothing to the idea that somebody may see the advertisement next week after missing it this week. So they may, but that somebody will be influenced just as much by the new advertisement, and the new one will catch the old reader, too.

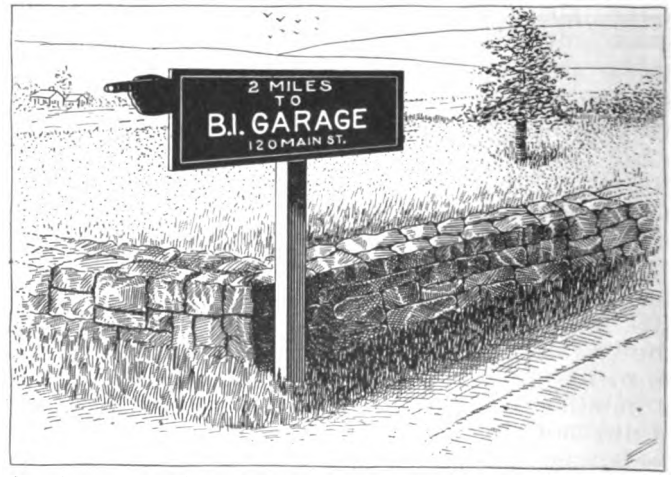
Then, people soon learn which advertisers are careless and leave the old stuff standing, and they cease to feel an interest in their space. They don't expect to find anything new there, and they don't look.

The only kind of advertisement that deserves to be left the same year after year is the sign over your door, and even that must be kept looking as fresh as paint will make it.

You wouldn't even think of sending out the same letter or even circular twice in succession to your mailing list any more than you would bombard a prospect with one copy after another of the same catalog.

It should be said right here that for the kind of advertising you are to do direct by mail, as well as for keeping in touch with prospects, you need to develop and maintain a carefully prepared mailing list, comprising the names of all possible or actual patrons of your garage.

To be without a good mailing list is to be without one of the best of means for developing business, and the mailing list ought to be something more than a mere list of a certain number of people living in your community. The names should all be



Advertise Upon Signposts in the Country Where the Touring Motorist Passes.

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classified so that you can take up with any group or with any individual any desirable proposition.

As the mailing list is made up each person's name should be checked in such a way as to show, if possible, what kind of a car that person has, if an owner. It should show the person's occupation, financial standing in a general way, residence (city or country), married or single, and any other items that have a bearing on your business.

You can make the list on sheets of paper with columns after the names, the columns being headed at the tops so that a check mark after the name in the proper column will give the information. For maintaining a list of prospective car purchasers or of actual customers about whom more information is needed, a card index is better. The mailing list ought to be made in duplicate so that loss or spoiling of a copy will not interfere with your work along that line. A good mailing list is a valuable piece of property to any garage man who wants to develop his business.

One class that ought to be indicated on your mailing list is that of people you know to be habitual mail order buyers, people in the habit of sending to the mail order houses for goods. These people will sooner or later order automobile supplies in that way, because they are receiving more or less catalogs of such things.

You need not start out with a big mailing list. The list should be built up carefully with a view to keeping from it all useless names and dead wood. It costs money to mail advertising, and every useless name on the list means a waste of actual money.

To begin with, have your list of customers. To this you can add, from memory, many names of people you want for customers. Further additions can be secured by making trips over the R. F. D. routes and taking names from the mail boxes. City directories and telephone directories are a source of names and by checking up the personal news items in the local papers you will be able to secure more names. In this latter way you can get the names of new families moving in—a particularly good class of prospects if they own cars, because they are looking for a garage at the same time you are looking for customers.

Your list should be watched all the time for corrections. People will die or move away or cease to be prospective customers. As far as addresses are concerned, the post office can check up your list and cross off names to whom mail can no longer be delivered, but it is against the rules of the department to add any names to a list. Take your list to the post office each time before you make a mailing and save the loss of postage on mail to folks no longer in your territory.

By co-operating with some merchant in a non-competitive line, you may be able to add to your mailing list. Each of you will be able to help the other on his list. In some towns the chamber of commerce maintains a complete list for the use of its members. This, if available, would be a help in making out your list, which has to be more highly specialized than most.

The work on a mailing list can be done at odd times by anyone who can do the work properly. If you have a bookkeeper, it will fit in with her work. Every employee connected with the garage ought to be asked to make a note of any new names that ought to go on the list, and if you all keep your ears open you will pick up many a prospect in this way.

Instead of leaving the addressing of envelopes until they are needed, have a pile of envelopes and the mailing list at hand in a convenient drawer and make it the business of the proper person to utilize spare time in addressing envelopes. In this way there will always be a set entirely or at least partly addressed for use, and when there is advantage in getting out something very quickly the envelopes are ready, and that much time is saved. The time is saved almost entirely, too, because it is more than likely that that same time would be idled away if the addressing job were not waiting.

THE POOR LITTLE RICH BILL.

BY GLADYS SCHUSTER.

"Who are you?" our editor said yesterday, when a sick-looking stranger appeared before him. "You look a bit familiar, although I'm sure I haven't seen you for some time."

"I'm a Dollar Bill," the stranger answered weakly.

"Oh—pleased to recognize you, Dollar Bill," cordially beamed our editor, holding out his hand. "You look a bit sick, old friend. What's the matter?"

"I'm not the same Bill I used to be," mournfully said the visitor. "I can only do about half the work I used to do before the war."

"Pretty tough," our editor reflected. "Have you been to see the doctor?"

"I went to see Dr. McAdoo," answered Bill, "and he told me that I'll never get my strength back until after the war. He said I ought to gain at least 25 or 30 cents in weight then. In the meantime, he said, I ought to have a rest, and my owner ought to lay me aside against the day when I will be worth more."

"That isn't a bad idea," observed our editor.

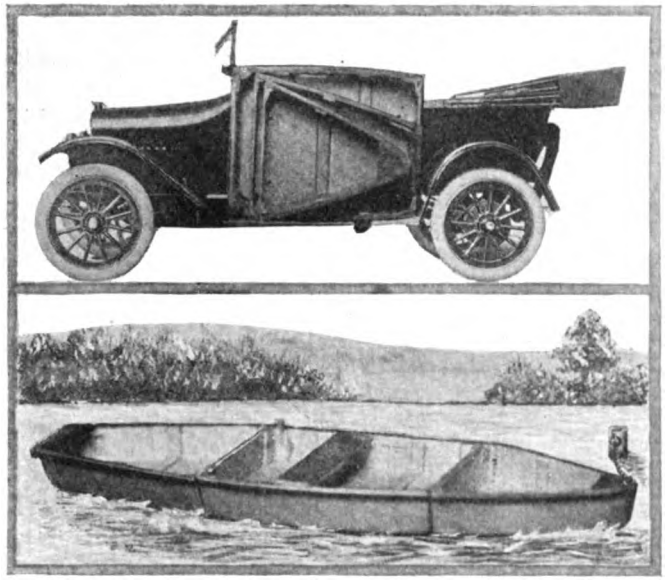
"I know," continued Bill, "that some of us Bills must go for food and clothing, no matter how weak we get. But there are lots of us that are going for luxuries and things that our owners don't really need. The fast times are killing us. I thought if I called it to your attention, you might say a word for us. Dr. McAdoo said a dose of publicity would help me. Now of course I don't want people to put me in a sock, or behind the clock case, until the Huns are defeated. My value will increase by investing me in absolute safety."

"How, for instance?" asked our editor, sympathetically.

"If you take four of us and add 15 cents to us this month, making $4.15 in all, you can buy a War Savings Stamp from Uncle Sam that will make me worth exactly $5.00 cash to you on January 1, 1923, and worth even more when you consider how much more $5.00 will buy then than now. There is nothing imaginary or theoretical about it, either. We Dollar Bills are valuable only because we can buy things people want. I am more valuable when I can buy more of those things than when I can buy less of them. And Uncle Sam will gain while you gain. He will have the use of your money when he sorely needs it, and believe me, he needs it. And I, Mr. Dollar Bill, will have the patriotic feeling that we have worked together for victory."

"Bill, you know what you are talking about!" exclaimed our editor. "Everybody ought to follow your advice."

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A NOVEL ARRANGEMENT.

Mr. G. M. Clark, of Battle Creek, Mich., has recently had patented a novelty boat which should be of great interest to the automobilist who takes his vacation in his automobile. This sectional boat is illustrated herewith and consists of three parts, a triangular shaped front, a center and a stern section. The boat is made of wood and each section is water tight in itself. The parts are so arranged that they may be bolted together in a very short time, and when completed the whole device is very practical.

Mr. Clark says that his idea was suggested to him by a friend while he was on a fishing trip about a year ago. He was traveling through the country in his automobile and tried at a number of places to hire a boat, but was unsuccessful. He is a pattern maker by trade, and immediately acted upon the suggestion, so that now he never has to worry when he desires to go fishing, for he carries his boat along on the running board of his car.

Remodeling the Ford Car For Speed

Suggested Body Design and the Few Changes Necessary Before This Universal Car Can Be Put in the Racing Class

About this season of the year the younger car owner, of the family, has an idea that he would like to make his Ford car just a little faster. If he owns the car himself he undoubtedly intends to do this sooner or later and is wondering about how much work must be done before he can accomplish the result.

Two great changes are necessary in the Ford car before it can be made into a racing model. The first thing that must be changed is the body. Neither the touring or the roadster bodies are designed for speed. The lines are square from front to the back and the resistance to the wind is considerable. The body must be made so that it will cut the wind, so to speak, and not cause too much of an "eddy" current at the rear. We have our lessons in body building from boats, and find that in general a shape which is considered a fast body design is equally efficient for an automobile.

Accompanying this article are a number of sketches, suggestions for a fast Ford body, showing a view from the top, the side, the rear, and the front in A, B, C and D, respectively. From the dashboard to the rear, the body is made from three pieces of sheet iron. The top piece, as shown at A, has a large square hole cut through it for the driver's seat. The two side pieces require no cutting. At intervals, pieces of L-shaped strap iron should be used to hold the parts together as well as to the frame. Instead of using L-shaped strap iron, a piece of iron may be bent to conform with the shape of the sides, and both the sides and the top riveted to it.

Of course, the angle iron is much heavier than the ordinary piece of L iron, and though this offers better construction, it adds a slight amount of weight to the chassis.

The body may be made at one side and placed upon the car after the seats and the tank have been put into place. The body should be provided with L-shaped castings and fastened to the chassis in the same manner as the ordinary Ford car is fastened. The gasoline tank should be placed directly in back of the driver's seat, and in conjunction with this, a force feed or vacuum system should be installed, together with a suitable pump on the dash. The frame itself requires little or no alteration.

A great mistake is often made in boring holes at various parts of the frame to reduce the amount of metal. As an actual fact, however, loss in weight is so very slight that it is immaterial. The stock semi-elliptic springs should be removed from the gear and four platform springs installed instead. This permits the dropping of the body some two or three inches.

A special type of spring hanger for the front axle is illustrated at G, and the rear spring is retained to the axle by a bracket, as shown at E. The ordinary Ford mudguards and fenders are altogether too heavy to be carried around, though the driver should not make the mistake of discarding fenders entirely for the very reason that pieces of gravel, sticks or metal are apt to be picked up by either the front or rear wheels and thrown into the driver's face, sometimes causing severe injuries. The fenders illustrated may be made of thin sheet iron and held in place by the regular Ford brackets.

The design shows the regular Ford radiator as is used at the present time, and in the writer's opinion this radiator may be used very effectively on a speed car, though if one desires, a special pointed radiator may be obtained.

In order to preserve the pointed effect with the present radiator, a new engine hood should be made somewhat after the pattern shown at F. The old engine cover may be taken off and the hinges used for the new one. The new hood should be provided

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with an opening on each side to permit circulation of air, and these openings should be provided with a coarse mesh screen to keep out such sand and gravel, but not fine enough to prevent circulation entirely. As far as the chassis and body are concerned, these changes are sufficient for speed purposes.

The car mechanism should be altered considerably, however, and these alterations are, if anything, more important than body changes.

Another article in this issue deals with the change in the gear ratios of the rear axle, and in it the statement is made that 1,000 revolutions per minute is the maximum engine speed for full efficiency. One of the reasons for this is that the valve operation at higher speeds does not give satisfactory results, and for this reason larger valve area should be provided. This is usually done by installation of a special 16 valve head, such as sold by the Laurel Motors Corporation, and with this device higher engine speed is obtainable.

The second method of boring the valve ports and valve seats and putting in larger valves is not practical because the area is not increased sufficiently. Then again there is the danger of cutting through the water jackets, for there is but little metal at these points between the valves and the water jackets.

Considerable additional volumetric efficiency may be obtained by boring the cylinders slightly larger and installing new pistons and rings. Where this work is done, leakproof rings should be installed rather than the plain bevel cut ring. One will find that by installing aluminum pistons much of the vibration is removed, and, therefore, the engine can be run at higher speeds. Many drivers make a practice of removing metal from the connecting rods themselves by boring small holes in the weight of the rod. Any amount of metal removed from the reciprocating parts is worth while, though one should be careful not to reduce the strength of the parts in question.

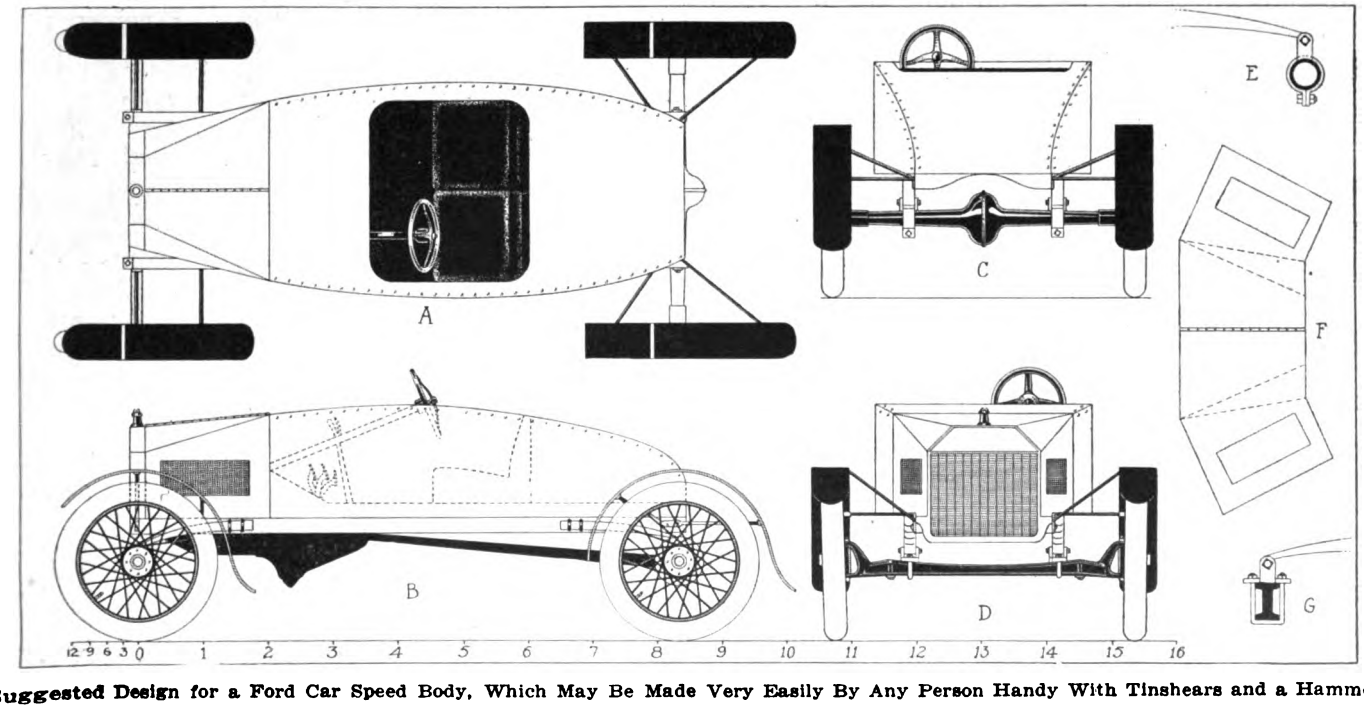
With a body such as we suggest, there should be no need for dropping the engine below its present position, for the center of gravity of the car is plenty low enough, and the writer has seen a Ford car prepared in this way, attain a speed of from 75 to 90 miles an hour without any trouble from center of gravity. In addition to the present Ford lubricating system, an auxiliary tank of lubricant should be provided and fitted with a pump so that the driver or his mechanic may replenish the lubricant without stopping the car. An ordinary tank on the dashboard, fitted with a force pump and a tube leading to the oil base, answers the purpose very well. The thermo-syphon cooling system is not always efficient at the higher engine speeds, and some form of circulating device should be furnished.

Although the Ford magneto answers the purpose very well, much weight can be saved if the permanent magnets and the spools are removed and the engine fitted with a high tension magneto. The weight of a magneto is considerably less than the weight of Ford coils and the Ford magneto.

If the machine is to be used for racing purposes only, much of the weight may be lessened by changing the transmission. By this, we mean the removal of all of the present transmission parts, except the flywheel. If this is done, a connection must be made between the flywheel and the propeller shaft inside a transmission. The housing necessarily must be left in place because it carries rear engine supports, but the gears and the cones may all be taken out.

When this is done the car can be started only with the help of a number of assistants by pushing it along the track. This may sound rather absurd, but where plenty of assistance is obtainable, the gain is worth while.

Another point in remodeling the Ford car for speed is the change in the present Ford gear ratio. Gear ratios are sold by the Krom-Nik Gear Company, and in this issue is published a story dealing with gear ratios. For this reason we will not dwell upon this particular phase of the design.



Suggested Design for a Ford Car Speed Body, Which May Be Made Very Easily By Any Person Handy With Tinshears and a Hammer.

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Keeping Ahead of the Scrap-Pile In a Small Repair Shop

Ways and Means of Utilizing Junk Parts and How to Keep Them In a Systematic Manner So As To Save Time and Money

BY W. A. MANN

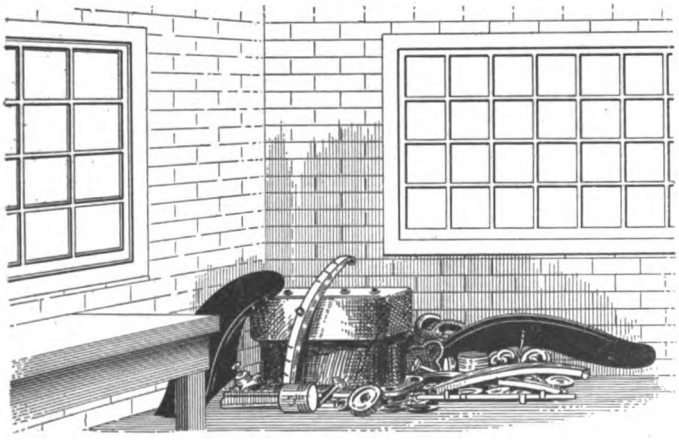
Continuing to write, as in preceding articles of this series, mainly for the man who is in need of a kind of information that is rarely to be acquired without more or less extended experience, it may be pointed out that the average small garage or repair shop is by no means economical of the space at its disposal. Space is wasted eight times out of ten, and as space has to be paid for in money, it follows that money is wasted.

Should any big establishment be operated, or should anyone be so foolhardy as to try to operate a big place, in the disorderly way in which small places too often are run, the result would be simply disastrous. The only reason the small shop proprietor "gets away with" things as he does is that the smallness of the business and the limited space do not permit the disorder to get so big that the boss can't remember, more or less, where everything is, or so that a search cannot be made without much delay.

But in a disorderly shop, no matter how small, it is utterly impossible that delays and inconveniences should be avoided. It is a fact well worth remembering that it is a difficult thing to think of an orderly, well-kept shop that goes out of business through any fault of its own. Just try and think of such a shop; it is almost impossible, and the fact tells a tale of its own.

Orderliness a Big Factor.

Orderliness, the principle of having a place for everything and putting everything in its place, has more than an indirect connection with making money. In all verity, there is a direct connection, for there is direct profit in being orderly and systematic, and this is not hard to prove. Unfortunately, it is no simple matter to get one man to lay his course in the light of another's experience. In other words, a man usually insists upon learning by his own experience, and this, in its turn, usually means that he must profit by his own mistakes.



From Day to Day the Pile of Junk Increases in Size; a Valueless Nuisance.

In these times of very high prices for everything the shop must buy, however, there is abundant reason why every step leading toward economy should be taken, and one of these steps is economy in materials. When a shop starts out in business, brand new and without a finger-mark on the whitewash on the walls, there is likely to be very little material in sight except what the proprietor has paid out his real money for, and naturally he does not pay out any more of that real money than he considers necessary.

It is not long, though, if the shop does any business at all, before the bare corners begin to get filled up. First it is a bit of a broken spring, perhaps, or a twisted fender iron, or a hopeless rim, all by itself. Then someone gets hold of another scrap of something or other, and doesn't know just what to do with it, and he looks around and sees the first bit of junk, and with a relieved expression adds his contribution.

First thing you know there's a regular scrap-heap there, and if nothing is done about it it stays there, and in time it becomes an institution, and what is at the bottom goeth beyond the memory of the boss. And as that corner is, so other corners are, and likewise the spaces under the benches and every other space that is not permanently occupied by a machine tool or a bench or something.

What Did He Do With It?

Sooner or later the time comes when a man remembers that a month or so ago he had a piece of scrap that would just come in handy for this or that job. He scratches his head until it becomes sufficiently sensitive to remember that it must have been thrown into that pile of stuff over behind the grindstone. No one knows how much has been dumped on that particular pile since; but he wants that iron, and he goes after it like a terrier after a long-buried bone. After he has spent time enough to have paid for a new piece of material, maybe he finds it. Maybe he doesn't.

Now there is one phase of this every-day proceeding that is good and one that is bad, and there is a good deal to be said on both points. Coming first to that which is good, it needs no long argument to prove that the economical instinct is a highly praiseworthy one. It always was, but just now it costs so like the mischief to buy material, that everything which can be rescued from the scrap-heap is doubly valuable. In fact, as will be shown, there are cases where it may be a good deal more than doubly valuable.

Take Care of Scrap.

The first thing to do in order to make the most of what commonly, or at least frequently, goes to waste, is to arrange to take care of the scrap from the beginning, so that there shall be no accumulation in corners and no wasted space, and so that a man will know where to go for anything in particular that

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wants. For let it be remembered that it is not at hard to dissipate all the economy that comes from ng up old material by wasting time in hunting it.

f a man's time is worth 75 cents an hour and he s up half an hour hunting for something to save nding 20 cents, it is a mighty wasteful operation, en the loss of money, which is not very serious in case alone, is added to the fact that the job is back half an hour at the very least, and prob- y more, by the time the scrap is worked into pe.

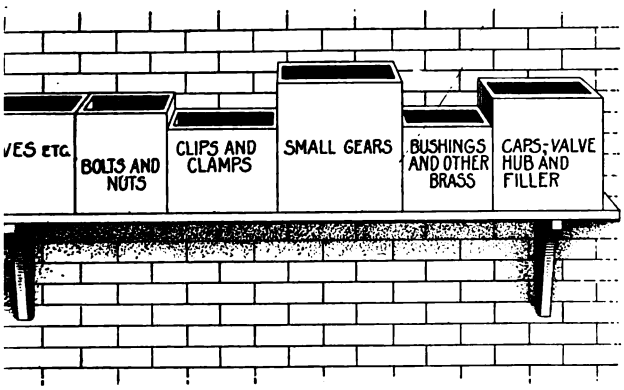
crap should be kept, if it is worth keeping as sible raw material, so sorted that it will be short k to find anything that may be needed, or to out if there is nothing of the sort that is wanted he shop assortment. It might be well to add to list of money-wasting economies the time lost ting for things that do not exist, or that did t and have been used up, or that can't be found use of the lack of order.

The Useful and the Useless.

he first thing to do is to provide plenty of places everything that may accumulate in the way of p. And just here it may be well to explain ex- y what we mean by scrap. Scrap, as we refer to ere, is not necessarily broken metal and smashed arts. It may be anything that is discarded after g a job, or that is partly damaged in some way, its of metal that are too small to be classed as k, etc. All this is in addition, of course, to what ly is scrap, such as broken parts.

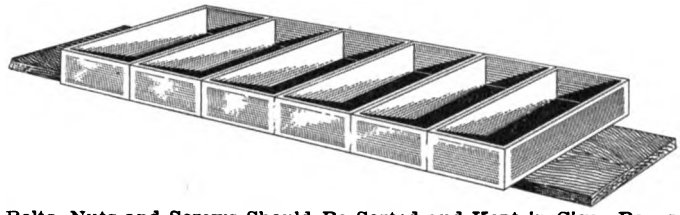
here is certain stuff that is not worth giving e to. Badly crumpled fenders and other sheet al scrap is of so little use that it is not worth the e amount of space it requires. Sheet brass, er, German silver, or aluminum may be saved a time, for they have a high value per pound as e junk, and ought to be carefully preserved down he last ounce. But the big bulky "tin" stuff, h is so often seen decorating shops, should be osed of with the least possible delay.

efore it is thrown out, however, or sold, if a market can be found for it, it is worth while emove braces, brackets or other irons that may ttached, if they are readily removable. Occa- lly a new fender iron is wanted, and it is not



Parts May Be Kept in Boxes, Neatly Labeled, on a Shelf.

ys easy for the small shop to get one at a mo- 's notice. With a few old ones on hand, how- it often is possible to pick out, if not a com- one that can be made to fit, perhaps two halves can be welded together. The same holds good regard to lamp and other brackets, brake rods, which often have clevice ends that are worth saving, steering links and other connections, brake bands, which often have end-connections that may serve useful purposes, pieces of shafts and tubes



Bolts, Nuts and Screws Should Be Sorted and Kept in Cigar Boxes, Which May Be Fastened to a Long Board.

of various sorts (tubing is valuable stuff under many conditions), valves, valve springs, etc. We will have something more to say, however, later on as to how some of this so-called scrap can be turned to account.

The Bin System.

The first step is to select places for keeping scrap and the second is to put in the necessary bins and boxes. The more the material is divided up the easier it will be to find any particular thing; but it will not do to make the subdivision so fine that it will be a sort of filing-clerk's job to figure out where anything belongs. There will be pieces of all sizes to take care of, and the little things must be kept by themselves. There is nothing in the world harder to find than a valve key, for instance, somewhere in a box with broken springs, old gears, perhaps a few old rims and the remains of a radiator for good measure.

It will be found profitable to start a series of small boxes for the smaller things, and for the purpose there is nothing better than cigar boxes. It will save time to rip off the covers. One way to handle cigar boxes is to nail them to a board in a row, or to nail them to boards in groups of from four to eight. This makes it practically impossible for a box to be carried off and left some place where the next man who wants it can't discover it.

The groups should be put on shelves low enough so that the contents can be "pawed over" conveniently. In these improvised bins can be stored odd machine screws, small bolts, nuts of odd sizes and threads, washers, lock washers, valve keys and other small keys, small springs such as are used in carburetors, carburetor parts, magneto and other electrical parts, battery terminals, switch parts, etc.

In fact, there is a great variety of parts that can be kept in this way. A convenient way to classify them would be to keep all the electrical stuff by itself, say in one or two groups of boxes, keeping the magneto and other ignition parts in one set and the starting-lighting material in another group. A separate box or two might be used for brushes and brush springs. Carburetor parts might well require a group of boxes.

Special attention may be called to the importance of taking care of such small parts as these. It is worth a great deal of bother, sometimes, to be able to find a part for some carburetor, magneto, or generator, that has gone out of busines, when it is badly needed. Even if the part is not new there are cases where it can serve a purpose by keeping the machine running until a new one can be obtained.

It is of course impossible to keep a stock on hand of new parts for every emergency that might arise, and the man who is prepared, as far as possible, for

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such emergencies is likely to be a valuable man to his patrons. Electrical brushes and brush springs are a case in point. A half worn brush will keep a generator or a magneto going, for the time being, just as well as one that is new, and if the boss knows where he can lay his hand on all the old brushes in the shop he may do his customer a good turn and also boost his own reputation.

Bigger Boxes for Bigger Things.

Boxes of a larger size are required for larger parts, as a matter of course. Good substantial grocery or hardware boxes can be obtained readily for this purpose, and as these are not likely to be carried around much, if at all, it is hardly required that they should be nailed down. This group of boxes may be used to hold old valves and valve springs, pump parts, small gears and shafts, bushings and bearings, radiator and other filling caps, hub caps, spring clips and clamps, small brackets, large bolts, nuts and washers, valve cages and caps, guides and other odds and ends of something like the same size classification. These boxes also may be stored on good substantial shelves.

(To be continued).

Repair and Adjustment of Brakes

From A Safety First Standpoint, These Units Are the Most Important Parts of a Car, Yet They Are Too Often Neglected

BY M. J. HENNESSY, M. E.

The most important and usually most neglected parts of an automobile are the brakes.

There are two kinds of brakes—good brakes and other brakes, and it is of vital interest to every man, who drives an automobile, to see that his brakes come under the first classification. Bad brakes are responsible for numerous troubles. For example—if they are adjusted in such a manner as to cause one or both wheels to slide, when they are suddenly applied, the result is a torn tread on one or both tires, and possibly a blown-out shoe; unquestionably a blow-out, if the performance is very often repeated. There is no rubber tire made that will stand being dragged along a hard road while held in one position.

A man would hesitate a long time before he placed the tread of a new tire against the edge of an emery wheel which was spinning at eight or nine hundred revolutions per minute. On the other hand, the same man will, without hesitancy, apply the brakes on a rapidly moving car and produce the same effect on his tires as if he had used the emery wheel. In fact, the wear is greater, as the pressure caused by the dead weight and momentum of the car is far in excess of any pressure he could apply to the tire on the emery wheel.

Strain on the Car.

Then there is the terrific strain on the entire car due to a too sudden application of the brakes, and it is well to bear in mind that this strain affects every part of the machine. Even the body bolts, the top and the windshield supports, are not exempt from the strain, as a moment's consideration of the subject will prove. This is but one class of bad brakes. Another, and by far larger class, are those which are best described as "No Brakes." The causes of this condition are many and varied.

The commonest cause of brake trouble, in the experience of the writer, is that which is due to stiff operation or entire lack of operation of the flexible joints in the linkage between the control levers and the brakes themselves. When an automobile manufacturer goes to the expense of putting a clevis and pin in a certain place in the brake assembly, one may be quite sure that a flexible joint is necessary at that point. Therefore, it is up to you to see that the joint remains flexible.

Another great source of trouble is the brake drum. The money expended and wasted every year in putting good brake linings against bad brake drums would prove an extraordinary and beneficial item towards the support of our Liberty Loan.

Brake lining is usually a composition of woven asbestos fibre and wire. After a period of use, the wire strands become broken and present innumerable short sharp points to the face of the drum. These points cut into the surface of the drum. If you should take the trouble to examine a piece of worn brake lining with a magnifying glass you would be apt to wonder that the brake drum lasted as long as it did.

Now for the remedy. You can turn or grind the drum down to a true surface again. This, however, is a slow and costly process. On account of the large diameter of most drums in general use, the lathe has to be run at very low speed. Then again, on account of the egg or oval shape of most drums that have seen hard service, the cut has to be very light, and if the scores or grooves in the drum are very deep, and the drum is double faced; that is, if it serves for both an internal and external brake, as most of them do, there will be very little stock left and the drum may possibly collapse under pressure.

The New Lining.

If you are satisfied as to the stability of the drum when it is turned down, the next feature for consideration is the new lining. Manifestly, having reduced and increased the diameters of the drum, you must correspondingly reduce and increase the diameters of the brake shoes. Although there are other ways of doing this, the only successful way, in my opinion, is by the use of thicker lining, and very often you will find it extremely difficult to get the required thickness.

All things considered, it is a much cheaper and by far a better proposition, when the brake drums show signs of wear, to buy new drums from the maker and keep the details of the car as near standard as possible.

It is well when ordering the drums to order a complete set of bolts for them, as it is seldom possible to save either the old bolts or nuts. In attach-

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ing the new drums one should be very sure that every bolt is pulled up tight so that it will always stay in that condition. A loose brake drum can cause a very disagreeable noise and with constant use will necessarily get worse.

Use Care in Riveting.

In attaching the lining to the shoes or bands, care should be taken to have the rivet heads sunk as deeply as possible. When the countersinking is done on a drill press, the press should be set so that all the holes will have a uniform depth. If the work is done by hand one can make a guide by boring a hole in a piece of wood of such a size that it makes a sliding, fit on the shank of the countersink, allowing the bit to project as far as the rivet head is to be sunk. It is a good plan to use a drill one gauge size smaller than the rivet. Too much care cannot be exercised in making the lining lie close to the band. The surest way to attain this result is to cut the lining to the correct length and rivet both ends to the band first, then press the lining into place along the band and hold it in place with a couple of small hand clamps.

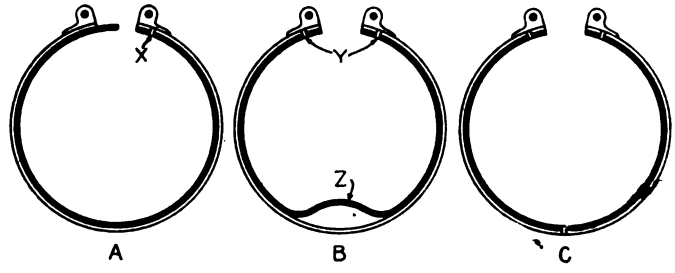
If these useful tools are not at hand a few pieces of soft wire twisted around both lining and band will serve the purpose. In setting up the rivets take a piece of round stock, the point of which is the same size as the head of the rivet, have it long enough to rest on the horizontal part of the vise and to project far enough above the jaws so that no matter which rivet one is working on, the band will always clear the vise—this to avoid spoiling the shape of the band; hold the brake so that the rivet head rests solidly on the round bar, use a "light" hammer and "draw" the rivet; by that I mean, hit it squarely and lightly until it fills the hole in the metal band.

No matter how nice a rivet looks, if it is not properly "drawn" it may as well not be there.

Replacing the Wheel.

After applying the lining the brakes are ready to be assembled. Before doing this, place one of the wheels against the wall, or anything solid, with the drum toward you; slip the band over the drum, draw the two ends together as tightly as possible and fasten them with wire or string. Now look carefully all around the drum and see that the band fits snugly. If there is a space between, at any point, "peen" the band at that point until the space disappears. Having seen that the bands are the correct shape, you will now attach them, making sure that all pins, bushings and slides are perfectly clean and well oiled.

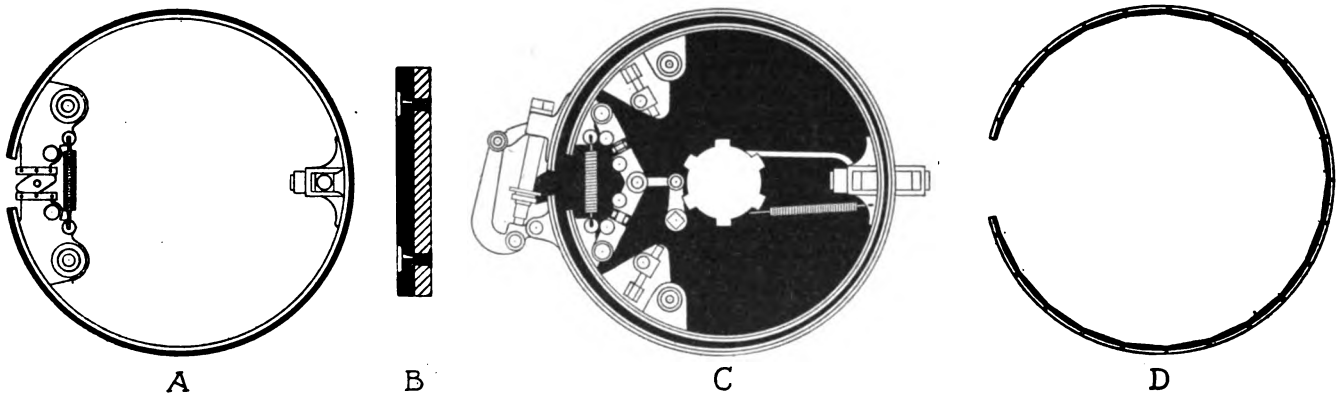
Too much stress cannot be laid on the necessity of having all clevis pins work freely. Every clevis pin in a braking system should be put in place with the fingers; never with a hammer. See that the male member of the clevis is in perfect alignment with the female. If one or the other has to be twisted with a screwdriver or other implement, it will not work freely and should be adjusted so that it will. When you have made sure that the bands are placed properly and all pins, releasing springs and anti-rattlers are in place, put on the wheels and proceed to make the adjustments.



Three Steps in Relining a Brake Band. The Fabric is Riveted at X; Then at Y, Leaving an Excess Bend at Z; Then at C.

On cars which are equipped with full floating axles it is well to leave the axles out until all other work is finished. In all cases I would suggest leaving one set of brakes entirely free until the other set is finished. There are a great many different cars in use and, personally, I do not know of any two, the details of whose brake adjustment are alike. It is therefore impossible to go further into particulars of the operation. The final essentials are the same in all cases.

If you have good brakes the wheels should be perfectly free when the brakes are released. Dragging brakes not only wear themselves out, but cause a waste of gasoline and tend to wear the engine. The brakes, when applied, should exert exactly the same amount of friction on both wheels, thereby reducing the chances of skidding to a minimum and saving wear and tear on the tires.



A, Shows an Internal Expanding Brake Band; C, Both an Internal Expanding and an External Contracting Band. Rivet Heads Should Be Kept Below the Surface as at B. A Poorly Applied Band Shown at D.

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Automobile Dealer and Repairer

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ADVERTISING RATES MADE KNOWN ON APPLICATION

NEW YORK, MAY, 1918.

Missing Numbers—Our Readers are requested to remember that it always gives us pleasure to re-send numbers which have gone astray in the mails.

The Automobile Dealer and Repairer in New Zealand.

Mr. R. Hill, Matlock House, Devonport, Auckland, New Zealand, is our accredited representative in New Zealand for obtaining new subscriptions.

CAUSE FOR LEGISLATION.

Our first story in this issue deals with automobile accidents, caused by carelessness, and it is interesting to note that out of 36,596 chauffeurs applying at the New York City offices for licenses in 1917, 6,394 were rejected after a road test. Two hundred and twenty-two women chauffeurs were given licenses.

It is not to be wondered at that the accidents in the country are increasing steadily. If only five-sixths of those applying for licenses are capable of driving cars, what must be the condition in some of the other states, where licenses are obtainable simply by mailing the fee to the commissioner of public roads.

The country today is facing a serious situation, and legislation is the only solution to the great problem which confronts us. We must reduce automobile accidents, but we cannot reduce them unless we reduce the number of inefficient automobile drivers.

Every state has its police department, for which they pay a considerable amount of the public funds for the purpose of keeping law and order. With the increase in the number of automobiles driven on the public roads, it becomes imperative that every state look to their automobile and roads departments. The point has been raised that were a road test incorporated in the automobile registration requirements, considerable money would be required. Doubtless this is true, but we feel that it is not a question of money, but a question of life.

The figures given above by Secretary of State Hugo, relative to the New York rejections, should be a lesson to the officials of other states. A driver who is not capable of running an automobile is a menace to the community. He is just as much of a hazard as a burning building, except that he is a menace to life, whereas the burning building is simply a menace to property; is there any comparison?

A driver who has contributed to an accident, by carelessness, because of intoxication, or through negligence, should have his license revoked; if not permanently, for a certain period of time. The public must be protected, and this protection should be had through the state departments.

FRIENDLY KINDNESS.

We know that our readers like our magazine, for we constantly receive enthusiastic letters from them. We know that you obtain much information from it and we intend to make it better with every issue. If you like our magazine, why don't you tell your friends about it? In this way you will be doing a kindness to them, helping us, and favoring yourself, for as our subscription list grows so does our magazine.

YELLOW DOGS.

In a recent issue of the Saturday Evening Post there appeared a story, called "The Yellow Dog," dealing with a peculiar situation in this country. The American people, as a race, have one big fault, and that is to gossip. Perhaps the real reason for this, is that our land is one of freedom. Without making libelous statements one may say just about anything he pleases without coming under the law. Free speech is encouraged and as a whole it is necessary. Free speech, however, does not mean gossip, and by gossip we mean the little harmful statements which one is apt to make against the Government.

Assume, for instance, that Mr. Browning, who is a confirmed pessimist and never agrees with anyone, does not like the way a certain situation is handled. His sources of knowledge relative to military movements is limited to within a radius of a few hundred miles. His information is obtained from the local newspapers and a few magazines. His judgment is based upon local conditions, and while going to his work some morning, he rides down with one of his neighbors. He tells his neighbor that he does not think the United States is meeting the situation properly. He does not think that we are sending enough men across. Although his neighbor may know that Mr. Browning is a pessimist, the statement has a certain amount of weight with him and he is very apt to repeat Mr. Browning's statement to someone in the office, bringing about a general feeling of discontent among two or three people.

Pessimism is a weed in the garden and grows like a weed. Sooner or later many people in the town have heard Mr. Browning's statements and as they have the same source of information that Mr. Browning has, arrive at the same conclusion.

Little colonies of this sort sprinkled throughout the country result in general discontent, and this is just what the Germans like to have. The next

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time your neighbor tells you of some fact which seems to show Government inefficiency, do not repeat it. The heads in Washington are just as anxious to win this war as you are. They will make mistakes, it is true. So do you. If you cannot boost America, better keep quiet entirely because every word you say against her is in favor of Germany.

Stamp out the seeds of dissatisfaction and the weeds of autocracy will soon die of themselves.

A TAX ON EDUCATION.

Unless something is done very soon, upon June 1st a law will go into effect which will result in the crippling of many of our magazines. We speak of the increase in postal rates.

At the present time our magazine may be forwarded from New York to Washington at the same cost as from New York to New Jersey. Under this arrangement, subscribers living in cities and towns away from the publication centers have the same advantage as those living at the publication centers. Under the new rate, however, there will be an increase in the cost of postage in some cases to nearly 800 per cent. of what it is at present. Do you think that it is fair for you to pay twice as much for your magazine if you live in California than a subscriber in New York? Doesn't this seem a bit unfair? Doesn't it seem as though a tax were put upon knowledge?

The education of a great number of people in this country can be traced to the magazine. Newspapers simply give general information relative to past and present events. It is not educational in the true sense of the word, whereas the average magazine is purely educational. Because of the fact that the present postal rules are so well drawn up, the price of magazines is low.

Few of our readers realize that their present subscription price barely pays the cost of postage. To meet the demand for higher postage rates many magazines will be forced to increase their subscription rates and therefore many subscribers will be lost.

We receive letters daily telling us that our readers will gladly pay increased subscription rates rather than lose the magazine, but we do not think that such a step should be made necessary. We do not feel that the reading public should pay a price for their knowledge and so we want all of our readers who have not already done so, to write to their Congressmen at Washington, asking for a repeal of this law. The Congressman's name may be ascertained from the local postmaster.

KEEP YOUR CAR IN CONDITION.

The production of new automobiles has been cut down to a very great extent and rumor would seem to indicate that the production might be cut down still more. For this very reason every automobile owner should do his best to keep his car in condition. The year bids fair to be one wherein the used car will predominate.

In former years many owners were prone to discard their old cars for new ones, but this year the supply will not be any too large to fill the demand of new purchasers. If you are a repair man, now is your opportunity, and you should take advantage of it. It is your chance to make a name for yourself. If you do good work you will surely succeed and your reputation will grow better, because of the fact that you will have so many customers.

If you are a car owner you should read the magazines and get acquainted with your car. The Automobile Dealer and Repairer is written from a practical standpoint. It is written in plain English and in such a way that every reader may understand the repair of automobiles without any difficulty.

In every issue we intend to take up the repair or maintenance of some part of the car and explain the work so thoroughly that any reader with mechanical ability may do the work himself.

IDEA EXCHANGE.

Not long ago our editor was in a small garage, where the owner was particularly alert. The owner looked after the interests of his employees and used his brains. If the employees brought forward any particularly good ideas or suggested any new tools, he carefully looked into their suggestions and followed them, if possible.

Our editor was surprised to see the various little devices which the garage men had made for doing various kinds of work, and he felt that if every garage in the country had as many and ingenious devices for saving time, there would be fewer dissatisfied customers.

Why is it not possible for us to form an Idea Exchange Society? Suppose you, Mr. Reader, sent us in one of your ideas about some handy tool or device which you have found to be of use around your automobile or garage. In exchange for your idea, you will receive, through the columns of our magazine, an idea from someone else. Your idea has helped you greatly, perhaps, and you will receive much benefit from the idea which you receive in exchange. The best part of the transaction will be that you will only furnish one idea, but in return you will receive many thousand, providing all of our readers feel the same way that you do. Don't you think that this will be a fairly good bargain?

GASOLINE VS. PATRIOTISM.

A few days ago, at the height of the Liberty Loan campaign, a delivery car stopped in front of our office. The car was well plastered with Liberty Bond posters and we had a feeling that we could put our hands on one patriotic merchant, without reaching very far. The driver left the machine, and as time went on, our feeling toward the merchant gradually changed.

When the driver resumed his seat in the machine fifteen minutes later, we had a feeling that we knew of at least one merchant who was doing his bit in helping Germany.

Perhaps you wonder what caused the change in our feelings. Let us tell you. During the fifteen minutes' stay in the building the driver had left the engine running. A small matter, perhaps, but every gallon of gasoline wasted over here means one gallon less for our allies in France. Are you doing your part toward cutting down useless waste? If you are not, you are helping the Kaiser.

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Water Vapor In Engine

The Introduction of Water Vapor in the Cylinders Said to Be a Cure For the Carbon Evil

In both the March and the April issues of this magazine we considered various phases of the heavy fuel problem and its relation to the gasoline engine of today. In this article we will explain, in more detail, one of the statements published in a former article relative to the introduction of moisture with the fuel into the engine.

Most engineers have agreed that water vapor is a partial solution of the heavy fuel problem, but a larger number of them have agreed that an engine seems to operate better when moisture is present with fuel. An extensive number of experiments have been conducted with the idea of proving that water is a carbon remover or carbon eliminator. These experiments intended to show that when steam came in contact with carbon, which had been deposited on iron surface, the carbon had a tendency to curl and break away from the surface. For this reason they have conceded that if water is properly vaporized and introduced into the cylinders, it removes at least a portion of the carbon, if not all.

Moisture Helps Engine.

Every motorist knows that his engine gives better results on a damp or foggy day, and he also knows that better results are obtained in a fog than in a rainstorm. Taking all of these facts into consideration, it would seem that water could be used very advantageously in the average engine, and to get the proper results, the water should be in the form of superheated steam or finely divided vapor.

In Figure 1 there is shown two types of water vapor devices which may be made by the average automobilist who is handy with a pair of shears and a soldering iron. At A is shown an ordinary tin

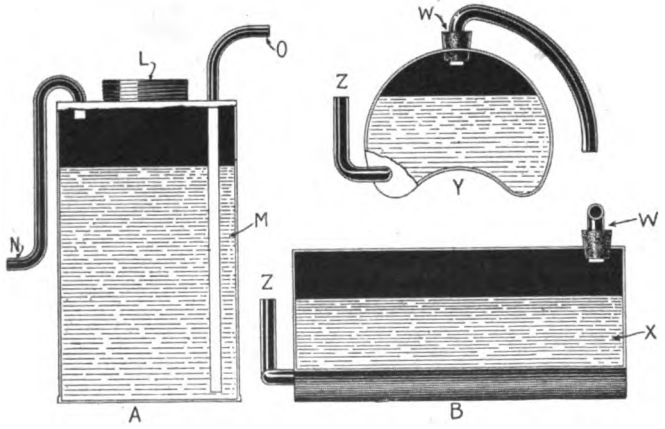


Fig. 1.—Two Easily Made Water Vapor Devices for the Engine.

can which is provided with a screw filler cap L and two brass tubes about ⅛ inch in size. The tube L should be soldered into the top of the box, but should not extend into the chamber M. The tube O should extend nearly to the bottom of the chamber and is open to the air. N is connected with the intake manifold or the carburetor between the throttle valve and the mixing chamber of the carburetor.

The can may be located at any convenient point, the nearer to the engine the better, because the water contained in M should be kept at as high a temperature as possible. The water level in the reservoir should not extend more than three-quarters of the distance from the bottom to the top of the can, else there will be danger of pure water entering through the tube N to the engine.

A Second Device.

A device of a similar style, but not constructed so easily, is shown at B. For making this, a length of stove pipe about four inches in diameter should be used. The stove pipe should be bent, as shown in the end view at Y, to conform with the shape of the top of the exhaust manifold and fitted with two ends. After it has been bent, a hole should be bored very near the bottom and a tube soldered in, as shown at Z. The top of this tube should be at least one inch below the tube of the reservoir and serves to prevent the water level from rising too high in the chamber.

Soldered upon the extreme top is a spout about one inch in diameter, W, which is fitted with a cork and an outlet tube which is connected with the intake manifold at the same point as directed in the first case. This device is clamped to the top of the exhaust manifold, and the heat generated by the combustion is imparted to the water, which is vaporized to a certain extent. Water may be used in either one of these devices, and the results will be very satisfactory. A device of this sort is practical because of the fact that carbon remover may be placed in the reservoir in place of the water, when it is necessary to remove carbon deposits in the engine.

It is not always desirable or practical to install an extra reservoir for carrying water on the engine, and so we give in Figure 2 two methods whereby one may connect the cooling system of the engine with the intake manifold. At A is shown a simple arrangement which can be installed in a very few minutes. The engine water jacket is tapped to receive ⅛-inch pipe fitting at O, and connected with the ⅛-inch pipe fitting is a long copper tube which is wound around and around the exhaust manifold, as shown at N.

The other end of this tube should be connected with a valve M, which is screwed into the intake manifold. At any time the valve M may be opened or closed to admit more or less water into the engine. A slightly more complicated arrangement is shown at B in the same figure. In this case the copper tube is tapped into the water jacket, as shown at P, from whence it is carried through the exhaust manifold, down its length, and out again at R; then connected with the intake manifold through the same type of fitting as at M.

At the points where the copper tube enters and leaves the manifold a stuffing box should be provided, as shown at S, else the exhaust gas will leak out past the tube. The big objection to the two

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latter types of water vapor devices is that the water used is from the radiating system, and, therefore, the system requires slightly more water than ordinarily.

There are a number of devices now on the market

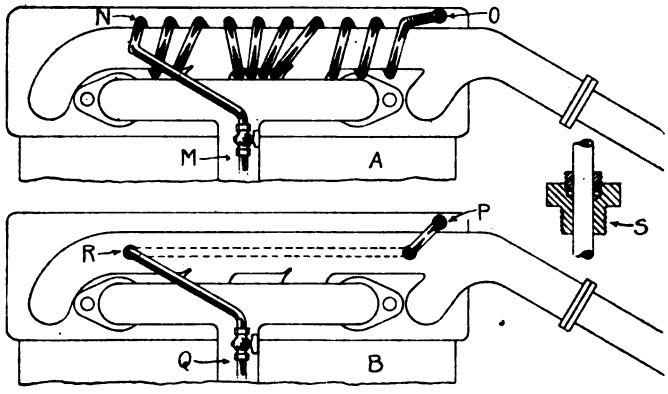


Fig. 2.—Two Methods Often Used for Heating Water Before Introducing It Into the Manifold.

for accomplishing the same purpose, should the automobile owner not care to construct one himself.

Don't trim a friend while trying to give the impression you are doing him a favor.

EFFECTIVE GEAR RATIOS FOR FORD CARS.

The Adaption of the Ford Car for Special Work and in Various Parts of the Country Is an Item for Serious Consideration.

The subject of Gear Reduction, to the owner of a Ford car, is undoubtedly interesting, when one considers the fact that there are more than two million Ford cars used today—some of them for racing—many as runabouts—a large number for touring cars and thousands for delivery and trucking purposes.

This sturdy little car was originally designed for pleasure purposes, but, owing to its great popularity and efficiency, it has been converted into trucks, tractors, etc., and has been used for almost every purpose to which a motor vehicle can be adapted.

About five or six years ago, when the high-speed engines first came into use for passenger cars, the automobile engineers began to experiment with lower gear ratios. Up to this time the original passenger car had been equipped with a three-speed transmission and in some cases a four-speed transmission with driving gears from 3:1 to 3½:1 and sometimes 4:1 ratios. This reduction in gear ratio was found necessary in order to effectively apply the power of the high-speed engine. The developments since that time have thoroughly demonstrated that with a high-speed engine it is necessary to have at least a 4 to 1 or lower gear reduction where more than ordinary service is required.

The Ford car is equipped with a two-speed transmission and a gear ratio of 3.63 to 1, and in heavy going and where the car is used for trucking and delivery purposes this ratio does not permit the proper application of the power.

Efficient Engine Speed.

The engine in a Ford car may be run at 2,000 r. p. m. or 200 r. p. m., but it is not always efficient at either of these speeds. When running on low speed the individual stroke of the engine does not convey a uniform flow of power to overcome the inertia of the weight of the car, which is the reason why it slows down when in high gear running up a steep hill, yet a car will leap forward when in low gear and the motor is allowed to develop more power because of the greater number of strokes in a given time. Neither is the engine of a Ford car efficient at 2,000 r. p. m. for the reason that the power is wasted in vibration and the valves do not allow full charges of gas to enter the cylinders. Just as men can walk most effectively at about five miles per hour, the Ford engine will run smoothest and most efficiently at about 1,000 r. p. m., which corresponds to a car speed of twenty-five miles per hour in high gear or ten miles per hour in low gear. Therefore, to climb steep hills on high gear it is necessary to keep the car speed at about twenty to twenty-five miles an hour with the regular Ford gear ratio of 3.63 to 1.

The Standard gear ratio has been designed to cover the average requirements of Ford cars all over the world. It is just about right for the Ford touring cars in those parts of the country that are not too hilly, and it is correct for the Ford runabout in hilly country, and it handles the Ford sedan very nicely in flat country.

However, the low gear of the Ford car is only adapted for emergency use, temporarily with the low-speed pedal on a long hill. The noise is terrific when starting on steep hills or when in heavy traffic, and it is very tiring for the driver to hold the car in low gear and decidedly unpleasant for the passengers. The gear ratio in the rear axle should be such that it will take practically everything in the territory in which it is generally used, on high gear.

Ratios on Other Cars.

Take two other cars for illustration: the Overland has a gear ratio of 4 to 1 with a four-speed transmission, and the Packard 4.35 to 1 with a four-speed transmission, as compared with the 3.63 to 1 of the Ford with a two-speed transmission.

There has been developed a special gear ratio for the Ford car which is interchangeable with the standard gears in the rear axle and which consists of a ring gear having forty-two teeth and a pinion having ten teeth. The reduction afforded by these gears is the lowest which has been developed to date, and they add approximately 20 per cent. to the power of the Ford car.

In changing the gear ratio of the rear axle, it is necessary to change both the pinion and the bevel or ring gear, known as No. 2518. It is not possible to use a ten-tooth pinion with the standard ring gear, nor is it possible to use the standard pinion with a forty-two-tooth ring gear, because the teeth of the smaller pinion will not fit the teeth of the standard ring gear, nor will the standard pinion fit the teeth of the forty-two-tooth ring gear, owing to the fact that the teeth of both the ring and pinion gears must be made to match in pitch, angle, etc.

Special Gear Ratios.

The Ford car gives the best results in many cases when fitted to the requirements of the locality in which it is driven and for the body and load which it carries. Special ratio gear (bevel and pinion

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gears) for the rear axle of Ford cars are now being made in the following sizes:

2¾ to 1 Racing chassis—board track.

3 to 1 Racing chassis—dirt track.

3.63 to 1 Standard ratio for runabouts in hilly country, touring cars in rolling country and sedans in level country.

4 to 1 Special ratio for touring cars in hilly country and sedans in comparatively level country.

4.2 to 1 Special reduction ratio for delivery cars in all places, touring cars in hilly or muddy country; sedans in hilly, rough or muddy country, and all heavy commercial purposes.

All mechanics who have repaired Ford rear axles are familiar with the light roller bearing which is used on the propeller drive shaft and which holds the pinion or No. 2597-B in position against the ring gear of No. 2518. When the car is overloaded for standard gear reduction, its jumping and bucking (caused from the propeller shaft whipping up and down) gradually wears this light bearing and allows the pinion to separate and become unmeshed from the ring gear, and before very long the owner has to tear down the rear axle and put in a new drive pinion and sometimes a new ring gear, due to the fact that the gear ratio was improperly adapted for the purpose for which the car was used.

Therefore, it is apparent that a gear reduction of 4.2 to 1 with forty-two teeth in the ring gear and ten teeth in the pinion permits of sufficient additional leverage to make the strains on the propeller shaft and the bearing back of the drive pinion so much less that these parts will wear very much longer and will be less expensive to keep in repair. In addition to this, of course, the gear will perform much better service and pull heavier loads on high gear than if equipped with the ordinary standard gear reduction.

The A B C of the Storage Battery

2—Points To Observe in the Care and Maintenance, Two Factors Which Make For Long Battery Life and Satisfactory Operation

BY A. P. PALMER, E. E.

The average car owner does not realize that the storage battery is a part of his automobile, and an extremely important part at that. The battery should be cared for just as carefully as the engine; in fact, to keep it in condition it should be given even more attention than the engine itself. There are a number of rules which must be observed, and if the owner follows them, the life of the battery will be prolonged.

Seven Rules to Follow.

1. Never use a battery in a leaking condition or turn it out of the vertical position.
2. Add nothing but distilled water to the cells, and do it often enough to keep the plates covered about ¼ inch. Never fill the cells full.
3. Take frequent hydrometer readings to keep specific gravity between 1.275 and 1.300.
4. Give the battery a special charge whenever the hydrometer readings show it to be necessary.
5. Keep the filling plugs and connections tight and the battery clean.
6. Never allow the battery to become heated, in service, to above 110° Fahr. If the temperature reaches 100° burn all the lamps on the car while driving.
7. Never allow the battery to be subjected to low temperature while in a discharged condition.

Battery Installation.

A storage battery on an automobile should be so installed as to be in an accessible position, be protected from the dust and dirt of the road and be so held as to be easily removable. It should have free air space on all sides and be held in place by the handles rather than by resting on the bottom. If any of the cells are in a leaky condition they should be replaced at once, as the electrolyte will soon disappear and possibly cause damage to the car. Do not permit an open flame near the battery. The electrolyte in a cell consists of a mixture of sulphuric acid and water. Sulphuric acid does not evaporate, water does.

When the level of the electrolyte in a cell becomes low, it is due, under normal conditions, to the evaporation of water which should be replaced with distilled water only. If acid of any kind or alcohol is added, it will cause serious injury to the plates.

The battery should be examined every week when in use by removing the filling plugs and adding pure distilled water by means of a hydrometer syringe till the level is about ¼ of an inch above the top of the plates. Then replace the filling plugs tightly to prevent the slopping of acid. If electrolyte has been spilled from the battery, by accident, the loss may be replaced with electrolyte, the same specific gravity as that of the other cells.

In order to determine whether a battery requires charging or not, the electrolyte is tested by means of a hydrometer syringe. This should not be done after distilled water has been added. The electrolyte is sucked up into the syringe containing the hydrometer and the latter is read. A reading of 1.250 to 1.275 indicates that the cells are properly charged. From 1.250 down to 1.200 indicates a half charged condition. From 1.200 to 1.150 shows battery is less than half charged. Below this indicates battery completely discharged. After testing return the electrolyte to the cell from which it was drawn.

An exhausted battery should be re-charged at once.

Finding a Faulty Cell.

As the cells of a battery are connected in series, when they are charged, the same current passes through each, so that if one cell should have a lower reading than the rest, and this difference should increase from week to week, there is something the matter with the cell.

The trouble may be caused by a short circuit

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which may, if neglected, cause serious damage to the battery and requires the prompt attention of a good battery repair man.

If one cell regularly requires more water than the others, a leaky jar is indicated. A leak will cause the electrolyte to escape, and the addition of water will lower the specific gravity.

Any repairs necessitating taking the cells apart should not be attempted by the individual owner, but should be done by a competent repair man.

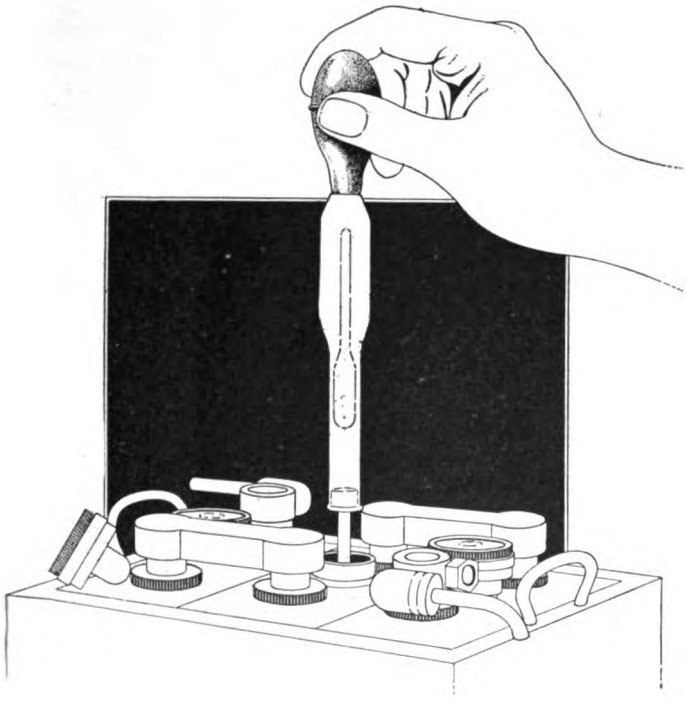
It is often the case, where a car is started and stopped a good deal, that the discharge rate is greater than the charge, so that the battery becomes exhausted. In this case it is necessary to remove it from the car and give it a separate charge.

If, during a tour, very little night driving is done, the battery will be charging continuously with but little or no current used for starting or lights. Under such circumstances the battery is likely to be overheated and ruined unless it is given special attention. If the lead connections on the top of the battery feel more than blood warm to the touch, take the temperature with a dairy thermometer. If over 100° is indicated, burn all the lamps while driving. If 120° is shown, the battery may be ruined.

Cold also has a bad effect upon a storage battery. At 10° Fahr. the available battery capacity may be reduced 50 per cent. and the voltage is also reduced. There is no danger of the electrolyte freezing in a fully charged cell. But in one which is over-discharged or has had water added without subsequent charging, this is likely to occur in cold weather. Cleanliness is essential to obtain the best results. The connections should be kept clean and dry.

Charging Connections.

In order to charge a battery the connections should be made as shown in Figure 2. Six lamps, each 110 volt, 100 watt, are connected in parallel



Taking the Specific Gravity of a Cell With an Hydrometer.

on a board, and this board is placed in series with an ammeter of at least 10 amperes' capacity, and the battery to be charged. This combination is then connected across a 110 volt direct current line, the negative terminals of battery and line being connected.

By unscrewing each lamp, which takes about an ampere, the current passing through the battery

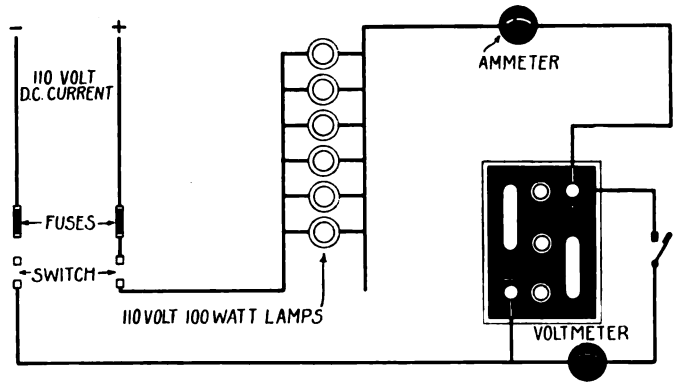


Diagram of Connections for Charging Storage Battery.

may be varied to suit the size battery.

If the battery is to be charged from a 220 volt circuit, two lamps may be used in series in place of one, as in the 110 volt system.

Never use alternating current with this system, and make sure that the level of the electrolyte is correct and the filling plugs are tightly in place before charging.

Adjust the number of lamps in circuit till the proper charging current is obtained, as shown on the instruction plate, and charge till a maximum specific gravity has been obtained for one hour and the cells are gassing freely.

Near the end of the charge remove the filling plugs to make sure that the cells are all gassing freely. Be careful to quickly replace and tighten the plugs or flooding will result. The time required ordinarily is about twenty-four hours if the battery is completely discharged. The specific gravity of the charged solution should be between 1.275 and 1.300, and the voltage about 2.1 per cell.

STORAGE BATTERY BOOK.

We acknowledge receipt of an Automobile Storage Battery book from the American Bureau of Engineering, Inc., 1018 So. Wabash Avenue, Chicago, Ill. This book should be in the hands of every person who has anything to do in the care and repair of storage batteries. The book has 284 pages, is copiously illustrated, and gives practically all of the information necessary for charging, maintaining and repairing storage batteries. Practically every phase of the battery field is taken up in detail, in a simple manner, so that it may be understood by any mechanic.

We can strongly recommend this book to our readers, and should any of them desire a copy they should write to the American Bureau of Engineering for price and other details.

Have you any definite plan for the regular saving of money, or do you just put aside a little when it is convenient? That is a mighty poor plan, for it is so seldom convenient! Just plan that you owe your savings bank so much at the first of every month, and make up your mind to pay the bill. You'll be glad some day if you do.

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This department is maintained for the protection of our readers—especially our reckless readers, if we have any.
The object is to encourage every operator of a motor vehicle to be careful and avoid accidents, especially the inexcusabe accident of a collision at a railway crossing.

Carelessness at a Crossing.—Because a driver chose to ignore all traffic rules and drive at top speed across an intersecting road, a three-year-old girl was badly injured and died later. The child was crossing the street, when the automobile, driven at top speed, turned and ran directly over the girl. The accident happened in Washington, and a short time later the driver collided with an electric car outside the city.

Trebling the Speed Limit.—One man was killed and three badly injured at Akron, Ohio, when the car in which they were riding, at about 90 miles per hour, collided with another machine and ran into a ditch. The speeding machine was on a straight road, overtook the second car, ran into one wheel and was thrown to one side into the ditch by the shock of the collision. The occupant of the second car escaped with a few minor injuries.

Ignoring Road Rules.—Physicians offer no hope for the recovery of an aged man of Little Rock, Arkansas, who was run down and seriously injured by an automobile, driven by a woman. The accident occurred at the corner of a street, and, according to by-standers, the machine was being driven on the left side of the road.

Driving on Sidewalk.—Two young men were badly injured, one seriously, at Athens, Ga., when a Ford car, driven by a chauffeur who chose to cut across the sidewalk, ran them down. Witnesses stated that the car was operated on the left side of the street, and that just before it reached the corner of an intersecting street, it was driven onto the sidewalk and over the two pedestrians. The chauffeur offered no excuses, and the steering gear seemed to be in good condition.

Excessive Speeding.—One man was killed and seven badly injured in Philadelphia early this month. A touring car, driven by a party of "joy riders" was hit and cut nearly in two by a heavy mail truck. Evidences point to the fact that both machines were being operated at an excessive rate of speed, and as an example of the effect of impact, a magneto from one of the machines was wrenched loose by the collision and thrown high into the air, through a plate glass window in a store nearby.

Rain Obscures Vision.—Bearing out one of the instances given in our first story, is an accident which recently happened on Long Island. An automobile, driven at high speed, crashed through the gates of a crossing, and the occupants were saved only by the quick action of the driver, who swerved the car to one side in a direction parallel with the tracks. The front wheels of the machine passed over the edge of an embankment, and the car hung by the rear. All of the occupants escaped by jumping from the machine. The driver claims that moisture on the windshield prevented him from seeing the crossing gates.

Rear End Collision.—What seemed to be a case of foolhardy carelessness was shown in a rear end collision in Peoria, Illinois, a short time ago. A car was being driven at a moderate rate of speed along a straight road when another machine, operated at 45 or 50 miles an hour, came speeding down and drove head-on into the rear of the former machine. The driver of the second car claimed that he was giving the automobile a try-out and didn't realize that he could not control it.

Aged Pedestrian Killed.—A well-known "horse" man was killed recently by a careless driver, who escaped without punishment. The victim was walking on a footpath near the city of Washington. D. C., when an automobile operated at a high rate of speed rounded the corner, "slewed" off the road and over the man. The machine was occupied by two men and a woman, and did not slow down, though their actions plainly indicated that they all knew of the accident.

Physician's Auto Hits Two.—A prominent New York physician was fined $25 in the Williamsburg Magistrate's Court last month on a charge of reckless driving. It was charged that he struck a wagon, in Brooklyn, and knocked the driver from the seat, but did not stop. A few blocks farther on, it is alleged, his car struck another automobile, standing at the curb, but he made no attempt to stop in this case.

Speeding Car Turns Turtle.—A Ford car, driven at a fast rate of speed, in Lima, Ohio, struck a hole in the road and turned turtle. The two occupants were thrown out and sustained many injuries. The rolling car pinned the two victims to the ground, and they were extricated only after considerable effort.

Run Down by Bus.—Because a citizen of Baltimore joined the "Jay Walkers" class, he is repenting at leisure in the hospital. The victim, who did not notice the approaching machine, stepped directly into its path and was knocked unconscious. The driver of the bus picked him up and carried him to the hospital. A patrolman, who witnessed the accident, absolved the operator from all blame.

Skidded While Speeding.—One man was killed and another badly injured in Philadelphia, two weeks ago, because the driver was reckless. Witnesses state that the car was being operated at a terrific rate of speed and that it was not slowed down to make a turn. As it came to the bend in the road, it skidded on the slippery pavement and crashed into a telegraph pole; it then caromed off and into a second pole. After this second impact it overturned, and the occupants were pinned beneath it.

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Motor Trucks in War and Commercial Service.

Requirements of Military Trucks As Learned From Operation On the Mexican Border and In France

BY G. W. SMITH *

The subject of military trucks has been more or less divided in discussion into two general groups dealing with operation on the Mexican Border and with operation in the war area of France. A summary, representing what may be called an average opinion of the truck engineering profession, is given below.

Changes desirable for service similar to punitive expedition in Mexico:

1. Great increase in cooling area of radiators, probably 50 to 75 per cent.
2. An increase in low-gear ability by increasing total gear ratio. This positively indicates a four-speed transmission with a low-gear ratio of not over 20 per cent.
3. An increase in high-gear ability by means of an increase in piston displacement. This value varies from 33 to 37 pounds gross weight per cubic inch of piston displacement.

In addition to the requirements as given above it is necessary to design the suspension of the various units with the greatest care in order that distortions cannot cramp or bind the various joints and moving connections. Many details of design need improvement and particular attention must be given to the lubrication of the various bearing points.

Changes Desirable for European Service.

For service similar to that of the Allied armies in France the following is indicated:

1. Improved design of detail and greater refinement in workmanship, particularly with reference to American trucks.
2. Somewhat more liberal dimensions of the various parts.
3. Increased radiation in some cases.
4. Better design of engines, incorporating such features as full force lubrication, improved carburetion, more liberal bearings, crankshafts, etc.
5. Improvements in the design of clutch and transmission units to facilitate repair and preserve the alignment of the various parts.

The foregoing covers, of course, the deficiencies of commercial trucks and does not sum up their virtues.

The manufacturer of motor trucks has to contend with some very adverse conditions in comparison with other industries. The buyer in most instances is a good business man, but does not have the experience or training to properly judge the merits of the machine offered. In fact, a considerable part of the merchandising end of the motor-truck industry is deficient in the elements that make for satisfaction to the buyer and seller.

The requirements of the Mexican service were extraordinary. The railroads, which should have carried the supplies, were in the hands of the "de facto" Mexican government, and, for reasons best known to our government, were not available for our service. This meant that trucks would of necessity be used where there were no roads and not a single favorable condition.

It is hardly conceivable that such a situation could arise. The conditions were neither those of peace or war, either one of which would have made it unnecessary to use trucks as they were employed. In case of war, railroads would have been seized and supply trucks could have operated from bases to supply points chosen with much more freedom and care as to road conditions. In case of peace, trucks could not hope to compete with railroads for the distances that were involved unless suitable roads were provided.

Adverse Conditions on the Mexican Border.

As to the maintenance of the trucks it is absurd to expect to provide anything that will show a reasonable operating cost under the conditions met with. The entire truck from tail lamp to front bumper was covered with a fine grit of first-class abrasive properties to a depth varying from one-eighth of an inch to one-half inch. Any joint sufficiently close to keep out this abrasive material would be entirely too close for lubrication requirements. The average truck stood up well considering that it was not intended to perform the service to which it was applied.

Another thing which should be considered is the personnel of the operators on the Mexican border. No criticism of the United States Army is intended, as the American people themselves and not their army officers are responsible for the condition of unpreparedness which arose at that time. It can be stated as a general proposition that the average truck driver was considerably under the desirable standard. Even the men sent from the factories were not above reproach, as many of them were hastily chosen and had little actual experience.

As a result, with few exceptions no attempt was made to operate trucks at governed speeds. This statement must be modified somewhat on account of the governor mechanism going wrong owing to deficiencies in design. In the main, the general statement is true.

Another difficulty was the absence of any suitable place to make repairs. Not until nearly the end of the expedition were proper conditions obtained. It was quite common for repairs to be made on the engine and other units of the trucks amid a perfect cloud of sand and fine dust.

Ordnance Organization.

These conditions were observed by the officers of our army, and we are happy to say that they will never again be duplicated. It would be difficult to accurately appraise the various operating organizations which have been brought into existence since the declaration of war. The work of the Ordnance Department is better known to the author than that

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of other departments, so his remarks will be confined thereto.

Many men have been chosen as commissioned officers to have charge of the operation of the motor equipment. These men have been selected with reference to their technical knowledge and familiarity with motor vehicles. It is safe to say that they rank as near 100 per cent. as is humanly possible. Schools are established at many points and the various vehicles are being studied from all points of view. It can be taken as a foregone conclusion that we will be proud of these men when they get over there and demonstrate the real ability that is in them.

Truck Drivers.

It has been stated that the drivers of trucks will be chosen from the National Army and possibly recruited by volunteers. No accurate information seems to be available at this time. It is earnestly hoped, however, that the selection of these men will be carefully considered. As a general rule few men who have driven passenger cars are suitable as first-class truck drivers. The truck driver should be strong, although not necessarily large, and should be possessed of sufficient judgment to recognize when trucks may be operated at full speed advantageously and when to slow down for rough going or over a chuck hole in the road which will jar the truck from end to end unless negotiated with care. Some of the best drivers in the commercial truck field are men who have been teamsters, and have been retained to operate the new trucks when they have superseded the horse-drawn vehicles. The operators should also be required to inspect and lubricate the vehicles as frequently as operating conditions will allow. Once daily, for many of the units, is none too often when it is considered that labor will be plentiful. Any reasonable attention will certainly be repaid many fold.

Large Pneumatic Tires.

An important recent development is the use of large pneumatic tires in sizes as large as 10-inch section, and it is stated that sections of 15 inches are commercially possible. The use of pneumatic tires does not mean simply putting them on existing chassis, but will demand larger engines and higher gear ratios to keep the engine speed at a normal value. It will also be possible to reduce the dead weight ratio to the pay load and greatly increase the efficiency of operation.

The heavy-duty low-speed truck may also extend the operating limits of trucks to territories now considered impossible. Road conditions involving deep mud and sand, where the tractive resistance may be around 500 pounds to the ton, may be dealt with successfully. On the other hand, it is extremely doubtful if sufficient power can be utilized by a rear-drive vehicle to pay for the greatly increased cost of construction and operation that of necessity goes with more power. The maintenance problem is by no means solved, as it must be remembered that any increase in torque must be taken care of by a corresponding increase in all the driving and supporting mechanism. The more powerful the vehicle, the more ability it has to destroy itself. Only a few years ago the automobile had arrived at a state of development where it would operate with fair satisfaction and economy. Immediately there arose a demand for more power. The power was accordingly forthcoming, and almost immediately the cry went up that the power was all right but the chassis was inadequate. The next year the chassis was strengthened, with an increase in weight and a decrease in power. This alternate change continued until the advent of the multi-cylinder engine, when the pressure was somewhat relieved. The simile between past history and the subject under consideration is possibly greater than is generally appreciated.

Possibly the most satisfactory application of the increase in power is to drive on all four wheels. This can be accomplished with a relatively small increase in weight and increases the ability of the vehicle to an extent that eclipses anything that can be hoped for in two-wheel driven vehicles. The effect is greatly augmented by the use of some form of friction differential. There is no question that the conventional truck can use a large amount of power when operated on dry, hard roads, but when sand roads and mud are to be negotiated the increased power is of little use, as the wheels easily embed themselves and lack ability to drive the front wheels forward or even to get themselves out of the hole.

As time goes on road conditions improve, grades are reduced and it becomes constantly more profitable to operate trucks. It is possible that some kind of finality may be achieved in the design of trucks. Until such time standardization should be undertaken with extreme caution. Any general standardization should be undertaken only as an extreme military necessity and not as a proposition likely to do good to the industry.

This remark does not apply to the various matters of detail such as spark-plugs, magneto bases, screw and bolt sizes, or even to the question of standardizing such things as wheel gauges. The last subject mentioned should be handled rather gingerly, perhaps, in view of the inconvenience caused by the standard gauge of railroads. It is general knowledge that the 56½-inch gauge was adopted as an inheritance from horse wagon practice in the swaddling days of the railroads. Endless inconvenience in the design of locomotives and cars by reason of the limitations of space between wheels is now the lot of the locomotive builder.

In summing up it would appear wrong to hastily discard any of the well-balanced vehicles now being furnished to commerce and substitute a new and comparatively untried combination of weight ratio to load and power. The only hope of advantage for such change would be an extremely doubtful chance of securing greater durability.

Economy With Good Roads.

Economy in transportation seems to lie in a very different direction. Good roads are coming almost automatically, and with them will come higher speeds. This brings us to the pneumatic tire. With the pneumatic tire will come larger ground contact and more "buoyancy," if the term can be permitted. This so-called buoyancy will make it possible to negotiate soft going without sinking in so deeply as with narrow solid tires. The average truck operates less than 10 per cent. of its total working time on bad road conditions, hence the latter design would offer more likelihood of success.

The development of the future truck must be the result of a natural evolution and not an arbitrary selection by a limited number of engineers with no positive knowledge of future events.

*Paper read before the Mid-Western Section of the S. A. E.

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Dealing With the Material For Wheels

Sources of Supply From Which Wood May Be Taken For Automobile Wheels Seems To Be Almost Unlimited

"There has never been, nor will there ever be, a scarcity of good wood for the making of wheels for motor vehicles," is the statement made by S. Vance Lovenstein, president of the Schwarz Wheel Co.

Very recently there has been considerable agitation among those in the automobile manufacturing circles because of the rumor that the available lumber for making wood wheels was being exhausted, and that with the decreasing supply, the wheel manufacturers would be inclined to substitute inferior woods. This apprehension, however, seems to be entirely without foundation upon facts.

Wood wheels used today upon passenger automobiles are made exclusively of hickory, because this wood has the greatest strength and resilience per unit of weight. A passenger car wheel must be made to withstand considerable strain, for such a machine is used very severely as far as traffic is concerned. Frequently it is driven at full speed around corners, it is forced over curbs, and it is pounded over rough roads at high speeds. The strain must be taken, necessarily by the wheels and great resilience is necessary.

This is the first property required, but strength is also a requisite factor. Every ounce of wood added to the wheel, however, means so much more unsprung weight, and so lightness must be considered. Therefore we have the reason for hickory in the construction of these units.

The wheels used on trucks are made principally from hickory, but in this case, weight does not play such an important part and we find many truck wheels made from other strong woods, such as white ash, white oak, hard maple, northern and Canadian birch, and rock elm.

These other woods have proved to be entirely satisfactory for truck wheels because of the fact that as the weight of the spokes and felloes is increased, the difference in strength and resiliency between hickory and the other named woods becomes less.

The use of all these varieties of hardwoods for wheel making is not new. They have been used for centuries and have proved themselves to be the woods best suited to the purpose.

Standing Hardwood Timber.

At the present time there are practically three hundred billion board feet of wheel-making timber standing uncut in our American forests, according to recent estimates, and of this amount nineteen billion board feet are hickory.

Approximately one hundred million feet, of all kinds of timber, are used annually for the making of wood wheels, and if the figures above given are correct, there should be no doubt in our minds that the available supply will last for many years to come, or until more trees are grown.

Conserving the Supply.

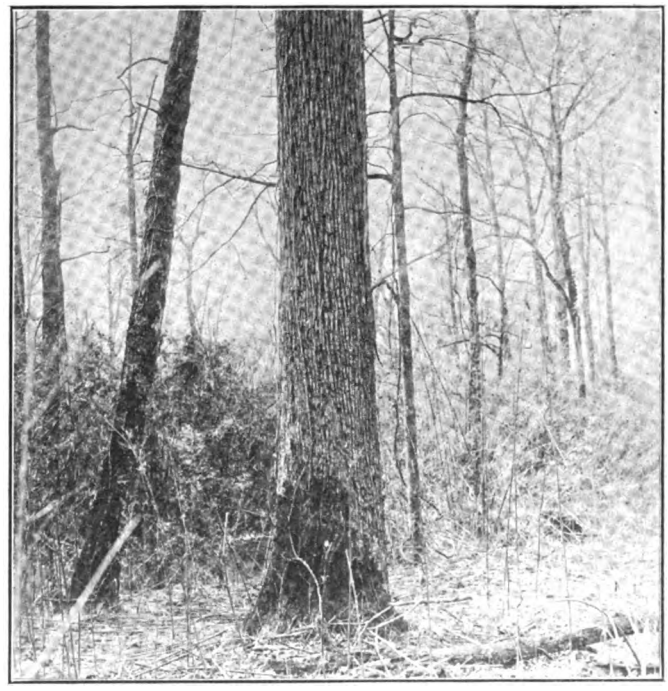
Of course, the varieties of hardwood used for wheel-making are also used for a great many other purposes. Some of these uses are undoubtedly wrong and wasteful and constitute a terrific strain upon the supply of these valuable woods. So much so that it must be the business of lumber producers, lumber manufacturers and governmental bodies to regulate, to a considerable extent, the uses which shall be termed "legitimate" for certain woods—especially hickory and ash.

In the case of hickory, for instance, conservation is already being practiced, although there are still millions of feet of this valuable wood being used where inferior and more abundant varieties would answer the purpose equally well, if not better.

For example, recent investigations made by the United States Forest Service show that more than 44,000,000 feet of hickory are used every year in this country for the smoking of meat products. While twenty-five other varieties of wood are listed as suitable for the purpose, the amount of hickory used is greater than that of all the others combined.

In some parts of Pennsylvania, hickory is used in the coal mines for posts, props, rails, cribs and lagging, while there are at least fifty other varieties of wood at hand, many of them even better suited to these purposes than hickory.

In West Virginia, oil-well derricks are made of hickory, while in certain parts of Missouri and in other regions where hickory is abundant, it is used



A Hickory Giant. Though These Trees Are Seldom Large, This One, in Arkansas, Measures 14½ Feet in Circumference.

for bridges, barn floors and doors, fences, sheathing, piling, culverts, cross-ties, car-stock and similar "wrong purposes."

Valuable Lumber for Firewood.

While accurate figures are unavailable, government experts say that as much good hickory is

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burned up every year for fuel and in open fireplaces as is used commercially.

All these wasteful uses of hickory, however, are correcting themselves gradually, for it is obvious that the higher value of this wood is making its



Hickory Bolts and Billets Ready for Shipment to Wheel Factories These Billets Are Ready for Immediate Seasoning and Shaping Into Spokes and Felloes.

use extremely expensive in cases where inferior woods can be used.

Even where a farmer has hickory trees upon his own land, it will pay him to sell his hickory and buy other lumber and firewood rather than to utilize the hickory for his own building, repair work or fuel.

In addition to the better regulation of the uses to which hardwoods shall be put, there is also to be considered the extensive forest conservation and cultivation programs now being conducted by the national and state governments.

At the present time more than twenty-five per cent of all the standing timber in the United States is owned by the national and state authorities, and this percentage is being constantly increased. The timber upon these reservations is being cut judiciously, the forests are being protected from fires and cut-over areas are being reforested.

Naturally the beneficial effects of public ownership and control will be felt much more in the future than they are today, although even now the admirable work of the government is being appreciated by the more far-sighted lumbermen and in some cases the government methods are being applied to privately owned forests.

The day of ruthless cutting of hardwood trees and inefficient wasteful utilization of hardwood lumber is about over. The practice does not pay. Lumber interests are waking up to the fact that it is really killing the goose which lays the golden eggs.

The Supply of Hickory.

Hickory—the ideal wood for wheel-making and the wood most generally used today—comes in greatest quantity from Arkansas, Tennessee, West Virginia, Kentucky, Indiana, Ohio, Missouri, Pennsylvania, Louisiana, Mississippi and Alabama. These eleven states produce about nine-tenths of the hickory used in this country the remaining tenth coming from more than a score of other states.

Hickory logs and bolts destined for wheel factories are cut directly into rim-strips and into billets for wheel spokes and felloes. Hickory going to handle factories and to vehicle makers is also cut by the saw mills into dimension sizes, and is therefore not classed as "lumber."

The method of cutting hickory, while originally done at the request of the manufacturers, is indirectly eliminating the waste of much hickory and making its use impracticable for purposes where inferior wood could be used. It is a tremendous step forward in the proper utilization and conservation of this valuable wood.

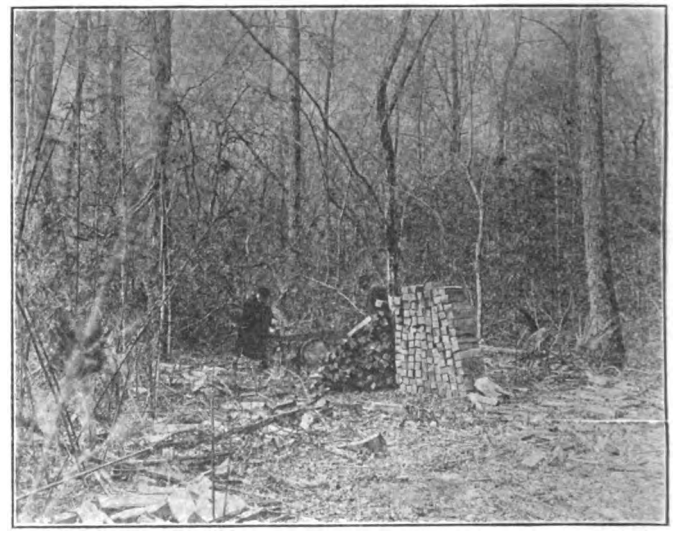
The Supply of Other Wheel-Making Woods.

The supply of white ash, white oak, rock elm, northern birch and hard maple—the woods used along with hickory for the making of motor truck wheels—is considerably greater even than that of hickory.

According to recent estimates compiled by the United States Forest Service, co-operating with the National Lumber Manufacturers' Association, it is shown that there are about five and a half billion feet of standing hardwoods in this country. In addition to this, we must not overlook the fact that there are vast quantities of good wheel-making wood in Canada; much of it even now being used by American wheel manufacturers.

There are thousands upon thousands more feet of uncut birch timber in Canada than there is in the United States, while other woods appropriate for wheel-making are being produced by our neighbor to the north in steadily increasing quantity every year.

So that, all things considered, the question of a



Cutting Hickory Logs Directly Into Billets for the Wheel-Making Industry. A Method Which Saves Time and Transportation on Waste Material.

possible scarcity of the woods suitable for wheels—not to mention the exhaustion of the supply—is one which should occasion no concern in the minds of automobile manufacturers or users of motor vehicles.

If you have an ambitious employee, subscribe for an Automobile Dealer and Repairer to be sent to his home address.

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SHIP BUILDING GROWTH.

Our Progress Described by Shipping Board Chairman.

Among the most interesting features of the speech which Edward N. Hurley, Chairman of the United States Shipping Board, delivered before the National Marine League were his statements as to what has been accomplished in the direction of output of vessels. According to Mr. Hurley, there were 37 steel shipyards in America at the time of our entrance into the war. Since then 81 steel and wood yards have been located, while 18 other yards have been expanded.

We are building in the new and expanded steel yards 235 new steel shipways, or 26 more than at present exist in all of the steel shipyards of England. As an evidence of our progress, Mr. Hurley referred to the record made by a Seattle company, which launched an 8,800-ton vessel 64 days after the laying of the keel. This ship was delivered to the Fleet Corporation on January 5 and started on her first voyage on January 14.

An Oakland, Cal., concern, Mr. Hurley said, had launched successfully three 9,400-ton vessels in a single afternoon.

Total Construction on March 1.

The total amount of our steel construction on March 1 was 8,205,708 deadweight tons, made up of 5,160,300 deadweight tons under contract with the Emergency Fleet Corporation and 3,045,408 dead-weight tons of requisitioned vessels.

Approximately 28 per cent. has been completed. In other words, the program for steel ships has advanced 28 per cent. toward completion. Of the amount of steel ships under contract and under requisition approximately 8 per cent. were actually completed on March 1. This amount of floating tonnage exceeds our total output in 1916, including steel, wooden and sailing vessels, by approximately 50 per cent.

Referring to the German ships in American ports which were taken over and found to be crippled by their enemy crews, Mr. Hurley said: "With the expenditure of a little less than $8,000,000 we have succeeded in placing in our war service and in the service of the Allies 112 first-class German and Austrian vessels, representing a carrying capacity of nearly 800,000 deadweight tons."

Development of Ship Yards.

As to the development of our shipyards, the 37 old steel yards now have 195 ways, as against 162 eight months ago. Other parts of their plants have increased proportionately. Thirty new additional steel shipyards are being erected with a total of 203 ship-building ways. Thus we now have in the aggregate 67 steel shipyards either wholly or partly engaged in Fleet Corporation work. These yards will have a total of 398 steel building ways.

Of these yards, 35, with 258 ways, are on the Atlantic and Gulf Coast; 19, with 66 ways, are on the Pacific Coast, and 13, with 74 ways, are on the Great Lakes.

Wooden Ship Facilities.

In addition, the capacity for wooden ship building has been increased until we now have 81 such yards with 332 ways completed or near completion. Mr. Hurley estimates that our output of wooden ships will approximate 2,300,000 deadweight tons annually.

The 332 wooden ship-building ways added to the 398 steel building ways give a total of 730 berths on which to build steel and wooden vessels—an increase of 495 within a few months.

Causes of Delay.

The delays that have occurred in the turning out of ships Mr. Hurley attributed largely to the slowing up of railroad transportation, more especially as the method of producing ships today is one of assembling rather than of constructing all the parts at any one point.

Delay has also arisen because of the unprepared condition of the turbine and engine manufacturers. Here, again, construction has been delayed by lack of transportation facilities. Mr. Hurley said, however, that the Board expects to make up for the shortage.

The first concrete steamship, recently launched, he stated, gave promise of being a success.

As to the number of employees in ship-yards, Mr. Hurley stated that whereas in 1916 there were less than 45,000 men employed in all the shipyards of the country, on March 2, 1918, the number had increased to 236,000, of whom 170,589 were working on actual shipping construction. In addition, the Board has recruited a volunteer force of 250,000 highly skilled mechanics, who have agreed to hold themselves in readiness for a call.

LIBERTY TRUCKS PROVE VALUE OF STANDARDIZATION.

Trucks built of standardized units have proven most satisfactory from the standpoint of construction and sheer efficiency. This fact is recognized by the engineering experts at Washington, who are working with the government and who have designed the various types and sizes of Liberty trucks. Orders have been placed with various truck manufacturers for 10,000 of the Class B Liberty trucks.

The exceptionally able engineers who created the Liberty truck fully realized, out of a long and ripe experience, that in order to design a truck which would withstand the shocks and severe usage incident to war, parts which have proven their durability and reliability by many years of service must be used.

They realized further that if the Liberty truck is to handle its full share of the many burdens placed upon it that it must have parts which are interchangeable, and which can be renewed upon short notice should occasion arise. The tonnage problem of transporting thousands of trucks to France is necessarily a serious one and no more space is to be used than is absolutely necessary.

Since standardized units and repair parts for Liberty trucks are of exactly the same dimensions in every case, it is obvious that far less of the vitally necessary shipping space will be used than would be the case if a few manufacturers supplied the trucks of their own individual design with a consequent far greater variety of parts necessary to keep the separate types in constant repair.

The far-sighted government engineers have kept this fact constantly in mind with the result that

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the standardized Liberty truck is a triumph of mechanical skill and engineering efficiency. That it will play a vital part in the winning of the war, is a foregone conclusion.

Similarly most of the individual truck manufacturers are building large and successful businesses by building into their product nationally known parts of recognized value. In many cases they would not succeed did they not do so.

Successful manufacturers of trucks appreciate that parts manufacturers, who have devoted many years and vast amounts of money to the perfection of special units, can produce better parts more economically than any one manufacturer who should attempt to build every part of the truck.

It has been fully demonstrated that the trucks which give the longest and most reliable service are those which are built of the best units obtainable.

Years of experimentation have proven that men who have designed and built a special part over a period of years know more about that part and are better equipped and trained to produce it than could any organization which attempted to produce all the parts of a truck.

A NEW BRANCH OFFICE.

One of the cities of the United States which has profited greatly by the war is Tacoma, Washington. At this city the port business has increased nearly 300% in the past four years. This great increase is due, both to its natural shipping facilities and its connection with the Far East and Japanese trade. In addition to these great commercial advantages, six huge shipbuilding plants for turning out both wooden and steel ships have been constructed recently.

In order to serve the shipbuilding and allied interests, as well as the constantly increasing number of manufacturing plants, the H. W. Johns-Manville Company have opened a new branch office at 1015 A street, Tacoma, Washington. At this office is carried a complete stock of asbestos packings, molded and in sheet form, and other well-known specialties made by this firm.

Do you realize which one of your habits is the most valuable and is worth the most money to you? If you don't know, set to work and find out, for you will need to take mighty good care of that habit and all the others contributory to it.

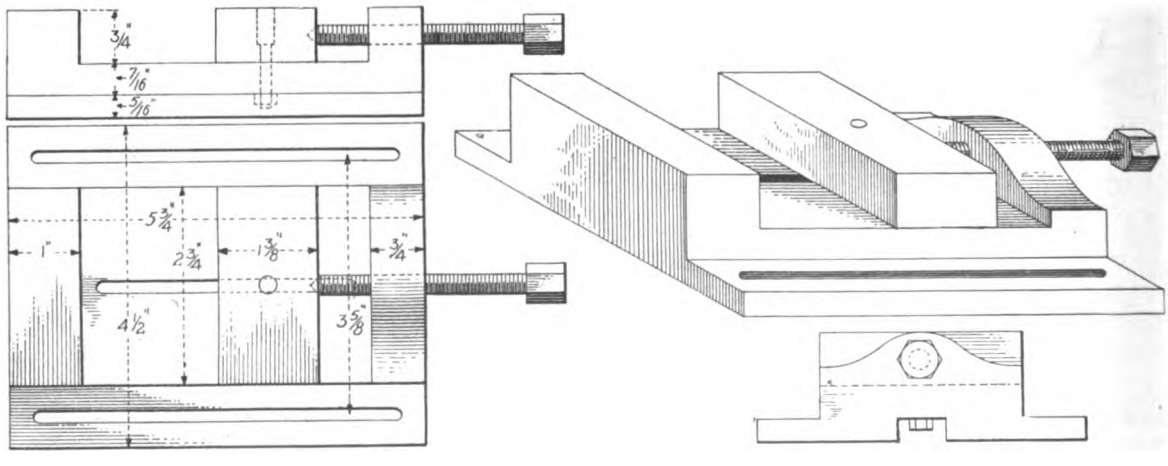
MAKING A DRILLING VISE.

The following description dealing with the making of a small drilling vise appears in Work, an English publication. It was made to suit a small Goodel-Pratt drilling machine, which drills up to ⅝-inch, and can be modified to suit the table of any other drilling machine by so arranging that the slots for clamping to the table are exactly above the slots or holes on the table of the machine to which the vise is to be fitted.

Two patterns of the dimensions given, one for the vise and the other for the loose jaw, were made, and all machining was done on the lathe, though, of course, if a planing or shaping machine is available it would be better. After cleaning out the slots with a file, the vise casting was mounted on the lathe faceplate and the underneath turned true; and to facilitate clamping to the face-plate, the pattern can be formed somewhat flat, as shown by the dotted lines. The casting was then reversed on the faceplate, so that the surface on which the loose jaw slides could be faced up as far as possible (the top of the fixed jaw being cleaned up at the same time), and the corners of the surface which could not be reached by the lathe tool were faced up with a file and by scraping, care being taken to keep the surface as true as possible.

The loose jaw was then mounted on the face-plate and one side, the top, and the bottom faced up true, and a hole bored right through the casting from the top to take the bolt. The hole was countersunk some depth to suit the upper part of the bolt, and the top of the latter was cleaned off to the level of the loose jaw. When the loose jaw is fixed on the vise the nut of the bolt is screwed up so that the jaw will slide, space being provided right across the casting to allow room for the nut. The vise casting is drilled and tapped to take the screw for tightening up as shown. It is made of hexagon mild steel and threaded 7/16-inch for 3 inches. The block has a slight countersunk hole drilled where the tightening screw bears against it. The jaws can be shod with cast steel—two old flat files let down to the right temper would answer well—but the vise grips well without.

This vise will be found to be most useful in drilling small or round work, and the way it is made, with the loose jaw free to swivel to a certain extent, makes it a useful tool for holding irregular or wedge-shape pieces.



Side, Plan and End View of Small Drilling Vise.

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TROUBLE-DEPARTMENT



This department is intended as a "trouble clearing house" for car owners, dealers and repairmen. Inquiries in relation to marine motors will likewise be answered as they are of interest to car owners and others who use the two-stroke cycle engine.

Readers are requested to make criticism and comments or to freely discuss any subject of interest to the automobile industry, and to add information of their own experience in remedying troubles.

Inquirers are asked to give the fullest information in every case so that replies may be made intelligently, and thus be of interest not only to the inquirer but to others.

Mixing Electrolyte.

2425

From Jas. Bond, Kentucky.—Will you kindly tell me how to mix water and acid for storage batteries, and how much acid to use? Is there any danger in charging a storage battery?

Reply.—In this issue of the Automobile Dealer and Repairer is started a story which will take up in detail the construction, operation, and care of the storage battery. It will be written in such a way that no one will have any trouble in understanding it, and we should advise you to read the articles very carefully.

Under ordinary conditions, the storage battery should require the addition of no electrolyte or acid, simply distilled water. When a battery is fully discharged a certain part of the sulphuric acid, termed sulphate radical, separates from the mixture and combines with the lead plates causing the specific gravity of the solution to fall. When in the discharged condition the electrolyte is nearly all water. As the battery receives a charge, the sulphate radical is driven off and combines with the mixture causing the specific gravity to rise. From this then, you can see that the amount of charge or discharge that the battery has, can be approximately told by the finding of the specific gravity of the electrolyte with the hydrometer. Unless there is a leak in the cell, there should be no reason for the addition of sulphuric acid or electrolyte, and should the electrolyte be added, one should be careful to add the electrolyte of the same specific gravity as that of the electrolyte in the other cells. In other words, the electrolyte in all of the cells of a battery should have the same specific gravity. Electrolyte should be mixed in a glass or porcelain dish. A large volume of water should be placed in the dish and the sulphuric acid added to the water very slowly. Chemical action resulting from the addition of the acid is very great and will cause considerable heat, and so the solution should be allowed to cool before it is put into the battery. Only the purest acid and distilled water should be used. When charging a storage battery there are certain gases that are likely to explode if a lighted match or open fire is brought near to them. This is the only danger that might arise, providing you are careful not to use too heavy a current for charging.

Soldering Radiators.

2426

From G. F. Freberg, Minnesota.—Will you please send me the regular kind of fluid to use for soldering radiators. I want something that will clean the old paint and grease and dirt out of the tubes. What kind of acid is the best to use for this and what do they use to cut it with. Is there anything else besides zinc to cut the muriatic acid. Will you please send me the best recipes that you have?

Reply.—Before beginning to solder the radiator, all of the grease and dirt should be cleaned from the parts to be soldered, with a strong solution of potash-lye and water. This solution will act on the grease and will not damage the tools or make it hard for the preparation of the part for soldering. Mix up a soldering solution of muriatic, or so-called hydrochloric acid, and water—about half and half. Into this solution cut or file some metallic zinc, as much as the solution will dissolve. The writer makes a point of leaving a small piece of zinc in the solution at all times. After this has been allowed to stand for about 24 hours, it is ready for use on the radiators.

With the potash solution and the soldering fluid, you should have little trouble in soldering radiator tubes.

Worn Cams.

2427

From Jacob A. Rettig, Indiana.—I have an Allen Model 34 Touring Car. It has made 5,700 miles, and has a tapping sound between the second and third cylinders, most notable on the cam shaft inside. In fact, the whole engine seems to be noisy. I have noticed that the second and third cylinders have a little less compression than the first and fourth cylinders, but valves and tappets are all right, and there is no carbon. That part has all been gone over. I have noticed that two other Allen machines have the same tapping as my car has, but not as loud, and mine only taps once to every revolution of the cam shaft. Is there something that can go wrong on the cam shaft?

Reply.—If the car is an old one the trouble is probably due to the fact that the cams are badly worn. In most cases cams become flattened on one side, and every time the shaft turns over the rough places catch on the valve tappets. It is very possible, too, that the tappets' faces are badly worn, and if they are the noise would probably sound the same. A possible cause might lie in the looseness of the tappet guides, that is, if this machine is fitted with tappet guides. Every time the cam presses against the side of the tappet, the guide is pushed to one side of the housing, resulting in quite a little noise.

We assume, of course, that you have adjusted the valve clearance properly. This distance should not be more than the thickness of an ordinary business card while the engine is cool, and not more than .002 while the engine is hot. The trouble that you have with the loss of compression may be due to the fact that the cylinders are worn out of round.

If this is the case, the reboring of the cylinder is practically the only remedy for the trouble. If the cylinder, however, is smooth and unscored, you might try the installation of a set of leak-proof rings, obtainable at most any automobile repair shop. We

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should advise you to go over the engine thoroughly, examining all of the bearing surfaces. This means the three main bearings, their caps and babbitt liners, the cam shaft bearing, the tappet guides, the valves and the valve guides. In practically every case the fit should be tight, and there should be little or no noticeable play in any of the members.

What your engine needs probably is a thorough overhauling, and if you have had any experience in the machinery line should have little or no trouble in doing this work yourself, though it might be wise to call in an experienced garage man for a consultation. This man could probably give you a few points so that you could do much of the work yourself.

Push Rod Repairs.

2428

From W. L. Richmond, Florida.—I have the R. E. O. 1913 Model, with which I have made about 12,000 miles, and I find a great deal of noise in the lower valve lifter guides. The valve lift rollers and guides are not worn, neither is there any wear on the cam shaft, but there is some wear on the top ends of the push rods and pins. Will you please tell me how I can stop this rattle? I have done all repairing on my car.

Reply.—The noise in your valve lifters may be caused by the wear of the cams or the wearing out of round of the tappett rollers. Run the engine until it has warmed thoroughly, then adjust the valve stem sections until the distance between the valve stem and the tappett is about .002 of an inch. If this does not stop the noise you might examine the cam shaft bearings and be sure that they are both tight on the shaft and tight in the engine housing.

Differential Trouble.

2429

From H. V. Kern, Minnesota.—I have an Overland 810 Model and the rear gears howl. Is it easy to take up the play or not?

Reply.—You should have no trouble in adjusting rear axle gears if you follow these directions.

First see that the pinion drive gear is tight in the housing and has no end play. Remove the cover plate from the differential and you will find a large adjusting collar on each side of the differential housing. This collar is kept from turning by a little locking device which must first be unlocked. Turn the right end collar until the master gear can be pushed tightly against the pinion gear. With your fingers feel the two gears and be sure that the edges of the teeth coincide, that is, the edges of the teeth are in line. Bring the left adjusting collar up against the bearing. The master gear will now be meshed too deeply so back off the left adjustment about 1/64 of an inch. Jack up both rear wheels, fasten a wooden handle to the pinion gear shaft at the universal joint and turn the shaft by hand. In this way you can set the gears back and forth and bring them to the point where there is the least noise.

Be sure to adjust both collars so that there will be only about 1/100 inch play in the differential or a barely perceptible amount. Be sure to put back the locking device when you finish the job.

Velie Valve Timing.

2430

From H. S. Goodell & Company, Michigan.—We have a 1913 Velie touring car, No. 31106, 4 cylinder, model R. The chain, driven by the crank shaft, runs the cam shaft and magneto. We took the chain off and in doing so did not mark the position of the cam shaft. We therefore got the intake and the exhaust valves out of time with the cylinders, on account of the crank shaft not being in the proper position. Please let us know where we must set the cam shaft so that when the No. 1 cylinder is on the top, ready for the downward stroke, the exhaust valve and intake valves for No. 1 cylinder will open properly. You need not explain the setting of the magneto because we know how to do this.

Reply.—The exhaust valve in No. 1 cylinder should close approximately five degrees before the top center.

While the intake should open about three degrees after top center, as a general rule the distance between the exhaust closing and intake opening can be divided in halves; the half mark being considered as top center. For instance, we will assume that you can mesh the cam shaft gear so that the exhaust closes 1/4 of an inch before the top center, a setting which causes the intake to open 1/4 of an inch after top center.

This would be what might be termed an ideal setting but impossible because of the gear teeth pitch or chain length. To mesh the gears or connect the chains you might have to advance the timing so that the exhaust closes slightly before 1/4 of an inch from top center, allowing the intake to open slightly 1/4 of an inch on the down stroke.

Leaking Storage Battery.

2431

From Charles H. Reker, Ohio.—I have a 12 volt Willard battery in regular service in a Dodge car, and the battery apparently is leaking. The cells test from 1124 to 1250 specific gravity. The volt meter readings are nearly uniform and a little over two volts per cell. The battery starts the motor perfectly at the present time and is about two years old. I would like to prolong the life of this battery if possible. How is the density of the acid tested? This has no doubt weakened in one or more of the cells due to the leakage. Also, is the piston pin in a Dodge piston stationary, or is it clamped in the connecting rod to oscillate with the rod. What is the size of the Dodge rings? Have they a step joint or a plain diagonal cut?

Reply.—We do not quite understand what you mean about leakage in your battery. The electrolyte in a fully charged cell should have a specific gravity ranging from 1.285 to 1.300 and the voltage of each cell should be at least two.

The leakage of the electrolyte would be evidenced by the necessity for frequent additions of distilled water, and in this case a new jar would be necessary. The leakage of current would be indicated by a rapid drop in the specific gravity. We can give you no definite rule to follow in this but would advise you to consult the Willard Battery Service Station man for only at the station can you obtain satisfaction. Battery up-keep is a branch of work that requires a great amount of study and knowledge. The piston

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pin or wrist pin in a Dodge car is fastened to the piston and partially turns in a bushing in the connecting rod.

The Dodge rings are 3/16x3-7/8 inches and regular equipment consists of a diagonal cut ring.

The pistons in this car are straight turned and have a clearance of .0025 of an inch at both top and bottom.

Connecting Rod Adjustment.

2432

From William Beaumont, Oklahoma.—I have an Overland No. 83 and find it rather hard to keep the connecting rod boxes tight. I do not know how much it has been run as I got it second hand but it looks all right. Do you suppose the cranks may be slightly flattened?

Reply.—Your trouble with the connecting rod bearings may be due to the fact that you do not fit them properly. Are you sure that you fit these bearings with the babbitt so they contact with the crank pin the full length? If there are high spots on the babbitt the machine will run for a time until the high spots are pounded down, then the bearings will be loose. You may tighten them up, and these high spots still remaining, will be in turn pounded down, leaving the bearing loose. The proper way to fit the bearing is by the Prussian blue spotting method, that is, covering the crank pin with a small coating of the blue and clamping the connecting rod in place. Turn the crank over two or three times and then remove the rod, scrape off the high spots which will be indicated by the blue marks and repeat the process until the babbitt contacts a full length of the crank.

Very careful measurement of the crank pin will show whether it is round or not. It very seldom wears out of round, but if such is the case, you will be obliged to remove the crank shaft from the engine and have the crank pins ground back into shape.

Dodge Car Mileage.

2433

From A. E. Barker, Colorado.—I have a Dodge 1916 car and would like to hear from some of your other readers as to what success they have had in getting greater mileage and more gasoline economy. I should like to know what devices they have found to be of advantage in obtaining efficiency.

Reply.—The writer has had considerable experience with Dodge cars as well as a number of other cars of 25 h. p. and less, and his personal opinion is that the Dodge cars in this part of the country should give slightly better than seventeen miles on a gallon of Texas gasoline.

The owners in the East, and we speak of those from Maine to South Carolina, have been averaging from seventeen to twenty miles on a gallon. We doubt very much if you are able to obtain this mileage for the very reason that climatic conditions in Denver differ greatly from those in the East. In the first place, there is considerable moisture in the air in this part of the country which affects the engine, in that more mileage is obtainable.

We should therefore suggest that you obtain one of the devices designed for admitting water vapor into the cylinders through the manifold. This is practically the only device which would make for greater mileage in your case; if, however, you are troubled by the engine refusing to start, you might install the carburetor heating device or a hot air stove.

Clogged Radiator.

2434

From O. I. Oldersham, Connecticut.—I have a Briscoe 624 model which heats up and boils. I think it is due to the radiator being partly clogged. Can you tell me of anything that will clean out the dirt and rust. Would a little lye or potash harm the radiator if it were rinsed out carefully.

Reply.—For cleaning the radiator and cooling system of your Briscoe car, you might try a strong solution of potash, lye and water or a solution of washing soda and water.

Deposits which may not be dissolved by one of these liquids will in all probability be dissolved by the other. Be sure to strain through a cheese-cloth or fine copper mesh before putting into the radiator.

Draw off all of the present water from the system and replace it with a cleaning solution. Allow the engine to run for a few minutes until the solution has been warmed thoroughly. Then allow it to stand for half an hour. Start the engine again until it is heated and fully circuited, then draw it off and replace with clean water. If you have running water you might turn the hose right into the radiator and let the engine run for a few minutes until all of the cleaning solution has been removed. Either of the solutions recommended should do no harm to the radiator or connections.

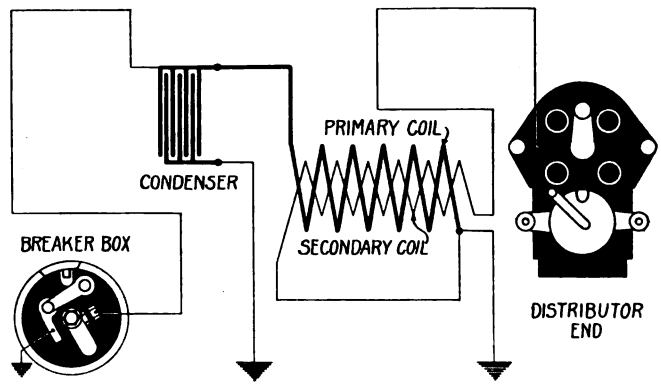
Reason for Grounding Certain Wires.

2435

From W. L. Pearson, Minnesota.—Will you kindly tell me why it is necessary to ground either the positive or negative poles of the batteries used for ignition on the Maxwell car?

Will you kindly give me a sketch of the internal windings and connections of the Eiseman high tension magneto as used on the Dodge 1915 model car?

Can batteries be used in conjunction with a Bosch high tension magneto, without using a separate coil?



Internal Wiring Diagram of Eiseman Magneto.

Reply.—The ignition system in the Maxwell car requires that the dry batteries used for ignition be connected in a certain way, for the very reason that the current generated in the magneto is always in a certain direction.

If the batteries were connected wrongly, the cur-

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rent from them would retard the current from the magneto, rather than assist it. In the case of the Atwater-Kent Ignition System on the Maxwell, the dry batteries act in conjunction with the storage battery and for this reason the grounded circuit should be the same. We are enclosing a sketch of the Eiseman high tension magneto, used on the Dodge 1915 car.

Dry batteries cannot be used satisfactorily with a Bosch high tension magneto without using a separate coil, for the very reason that the current generated by this magneto is alternating, and if batteries were used in connection with the magneto, the current from the batteries would act against that generated by the magneto.

Seizure of an Automobile for Services.

2436

From Martin J. Welch, New York.—Can you tell me the law, as it stands in New York State, relative to the seizure of an automobile for services on same and for supplies?

Reply.—We quote below Section 184 of the Lien Law of the State of New York which was given us by our attorney:

> "A person keeping a garage or place for the storage, maintenance, keeping or repair of motor vehicles . . . and who in connection therewith stores, maintains, keeps or repairs any motor vehicle or furnishes gasoline or other supplies therefor at the request or with the consent of the owner, whether such owner be a conditional vendee or a mortgagor remaining in possession or otherwise, has a lien upon such motor vehicle for the sum due for such storing, maintaining, keeping or repairing of such motor vehicle or for furnishing gasoline or other supplies therefor and may detain such motor vehicle at any time it may be lawfully in his possession until such sum is said."

It should be noted from the statute above quoted that possession is essential to the lien. If the automobile gets out of the possession of the garage owner or repair man, the lien is lost and the only remedy is to collect by the usual law suit.

Atwater-Kent Ignition System.

2437

From C. L. Smith, Connecticut.—Recently my garage man installed an Atwater-Kent Ignition system on my Model 35 Oakland, 1914 car. It does not seem as though the spark at the plugs were hot enough to ignite the charge in the cylinders. How can I remedy this trouble?

Reply.—We should suggest that you examine the platinum contact points in the breaker box of the Atwater-Kent Ignition units and see that they separate .006 of an inch when the breaker arm is riding on the top of the cam and also see that the surface of the points are smooth and flat.

If you will have trouble after repairing the breaker points, it may be that the current used for ignition is not strong enough. The current should be about six volts, and if you are using a six volt battery, it should be sufficient to give you a good spark. If it is not, examine all of the connections and the wiring, to be sure that everything is in condition.

Starting Lambert Car on Hill.

From B. D. G., West Virginia.—I hope that the following will be of interest to Mr. F. S. Pickering, who asked question number 2334 relative to the proper method of starting a Lambert car on a steep hill or other hard pull.

Starting a car of this type under a load is a matter of practice and study of the various speeds of such a car, as well as the proper application of the friction pedal. One must learn how much speed to give the engine in order to move the car and how firmly to apply the friction pedal to drive the car. The pedal should be applied gradually but firmly, but should not be pushed or jammed too suddenly. As the pedal is applied, the brake should be carefully released, so that as the clutch pedal is thrown in, the brake pedal throws out. At the same time the throttle must be advanced enough to keep up the engine speed.

We have very steep hills and mountains here in Virginia, as well as in Maryland and West Virginia, where I have been running my car. After I mastered the control of the car, I find that I can stop on any hill or mountain and start again very easily and without a jerk or jar.

The friction drive is very valuable for braking in descending steep hills or mountains, and used as a brake. I have run my car nearly three years, and only recently have had new brake bands put on.

Answers for Many of Our Readers.

From F. J. Williams, Iowa.—I am enclosing my renewal subscription money, and want to give a number of answers to questions in the February number of the Automobile Dealer and Repairer.

2342—You might tell M. Jessup of Michigan, that he should use less oil and a heavier grade, then he would have less trouble. I think his oil level is too high.

2345—Tell Mr. W. S. Wright of New York that his engine would never heat if it was in good order and the radiating system clean.

2350—Bruck Junk of Ohio should use heavier oil in his engine.

2359—Tell Mr. Lloyd Reeve, of New Jersey, that I have had a world of experience in burning kerosene, and I will say why I don't think it can be burned with success. The compression should be about 10 pounds more for kerosene and the carburetor should be different from a gasoline device. The engine must be designed for that sort of fuel and the kerosene kept at the boiling point. With the kerosene, water must be fed into the engine. The piston should not travel over 800 feet per minute when kerosene is used. Gasoline burns at about 160 degrees while kerosene requires from 212 to 220 degrees, bringing us back to the vaporizing question. A kerosene engine requires perfect ignition.

2361—Tell Mr. Harner, of Virginia, that an engine designed to be cooled with water should be so cooled and one for oil cooling should be cooled with oil.

Carbon Accumulations in Crankcase.

From Chas. Edward Prior, Jr., Connecticut.—Referring to query number 2351, in which Mr. Joseph Montag of New York inquires "what causes the accumulation of granules of carbon in the crankcase of an engine?" I would like to add my opinion to yours,

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thinking that possibly one source of the trouble referred to has been overlooked by your technical department.

One of the cars which I once owned caused some trouble of the kind referred to, and I came to the conclusion that carbon formed on the underside of the piston head, and after a time, owing to vibration and perhaps to other causes, separated itself from the surface on which it formed, then dropped into the crankcase in the form of granules.

It is well known that pistons run very hot. Piston heads being very thin, the temperature of the underside would be practically as high as would be that of the top exposed to the flame, and as sometimes the carbon on the top of the piston is in the form of granules, it seems not unreasonable to believe that carbon accumulates in large quantities in some engines in the above manner.

Editor's Note.—We have never heard Mr. Prior's theory advanced before, but undoubtedly it accounts for the trouble experienced by Mr. Montag.

Reply for Mr. Montag.

From B. W., Illinois.—Although a reader of your magazine for only three months I have gained a few helpful hints by reading your answers to questions in this department. I cannot altogether agree with you in answer to No. 2351. While some free carbon is carried in many auto oils, I do not believe there would be so much that it would settle in the crank case. I presume Mr. Montag found the carbon granules when he removed the crank case, after the engine had been run for some time, and not when he got his car from the repair man. If this is the case,

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NEW AND INTERESTING THINGS IN MOTORDOM

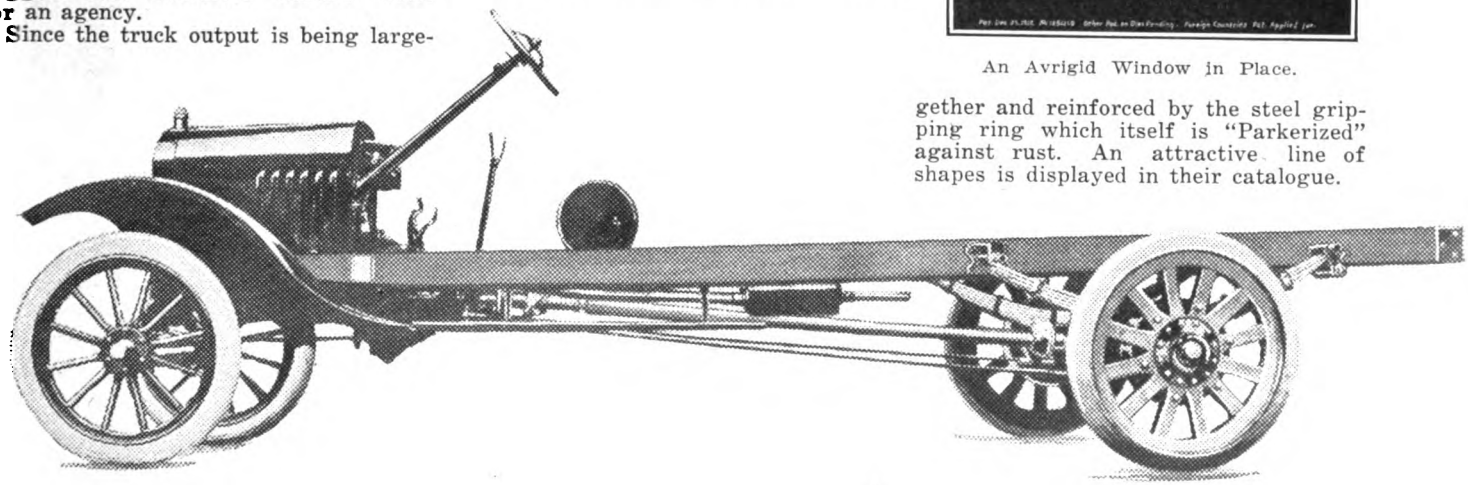
Burlington Truck Unit.

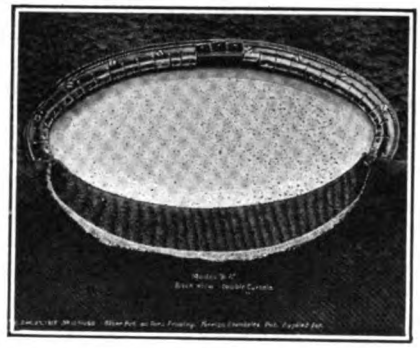
With the passing of every week, one finds the list of trucks in use increasing steadily. Many of these trucks are made from old passenger cars, and the car generally used for this purpose is the Ford. This machine may be adapted very readily by various truck units and the Burlington is one of these. This arrangement has been carefully designed and in such a manner that, with but little alteration, the Ford car may be made into a practical light truck.

The Burlington unit consists of a heavy steel channel frame well braced and reinforced by riveted plates and elbows at the corners. Two semi-elliptic springs, extending parallel, support the frame at the side, while a single semi-elliptic spring of peculiar design, called the helper spring, is fastened just above the axle at the back upon a cross member. This spring is intended to take the load when it grows excessive and the side springs are straightened out. The rear axle is of I-beam construction, all of the load being taken by it through roller bearings. The drive is by internal gears upon the wheel cones. The unit is designed to be put in place of the Ford rear axle and when it is in place the chassis is extended to a sufficient length for a large truck body.

The manufacturers, Burlington Motor Truck Co., of Burlington, Wisconsin, suggest that interested dealers write for an agency.

Since the truck output is being largely taken over for army use, there will doubtless be a great demand for conversion units of this type throughout the coming year, and we would advise our readers to get into this field as early as possible.





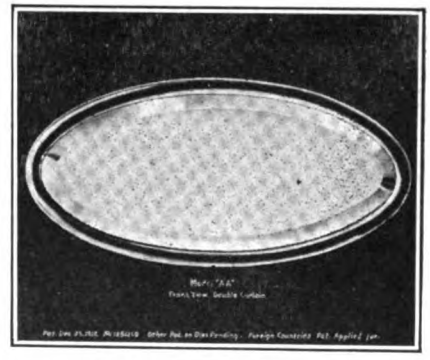
Applying the Avrigid Curtain Window.

Avrigid Curtain Windows.

The "Avrigid" plate glass auto curtain windows, manufactured and distributed by the Ever Rigid Auto Window Mfg. Co., 1017 S. Figuaroa St., Los Angeles, Cal., embody some entirely original features which should prove interesting to top rebuilders and manufacturers.

A spring steel gripping ring is used provided with resilient gripping fingers which hold the curtain material secure against tearing out and at the same time provide a cushion against which the plate glass is held firmly but without possibility of breakage. The construction of the retaining ring permits the tightening of the glass against this gripping ring by screws which may be safely set to their limit of tightness. The "Avrigid" is stated to be the only window with which it is possible to have the curtain flush with the plate glass and is entirely leak-proof.

The "Avrigid" may be neatly installed in either single or double (lined) curtains, with a retaining ring or without and also in conjunction with a wooden frame. Retaining rings are of heavily nickeled brass. The wooden frames are of non-warping construction, comprising two members glued together and reinforced by the steel gripping ring which itself is "Parkerized" against rust. An attractive line of shapes is displayed in their catalogue.

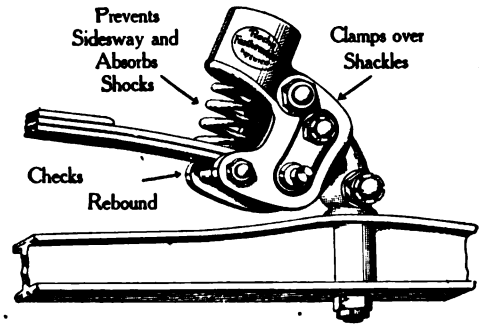


An Avrigid Window in Place.

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Featheride Shock Absorbers.

Doubtless every reader has wished that he could make his car ride as smoothly as the more expensive machines. The



Featheride Shock Absorber Applied.

Roche Electric Manufacturing Company, 215 North Division Avenue, Grand Rapids, Michigan, claim that their product, the Featheride shock absorber, when applied to a Ford car gives absolute satisfaction, in that the device prevents side sway, checks the rebound and absorbs shocks. This device consists of two small malleable iron jackets, a heavy steel coil spring and two bolts, and is clamped to the spring shackles without changing any part of the car. The illustration shows the device as applied and we would suggest that any of our readers desiring to purchase the shock absorbers write the manufacturers.

Bay State Autokit.

Prevention is better than cure, but an unprepared autoist is often unable to cure troubles, much less prevent them. An automobile requires a certain amount of attention that cannot be given unless the driver has the necessary repair tools and for this reason the Bay State Pump Co. manufacture a handy tool kit which is marketed by Geo. A. Cutter of Taunton, Mass.

This tool kit contains a large assortment of socket wrenches together with a heavy swiveling, reversible ratchet handle and several extension shanks. These fittings, together with a universal joint, enable one to reach and remove or tighten practically any nut or bolt in the automobile.

Every autoist should investigate this interesting line of tools which may be obtained in two sizes and at very low prices.

The Gas-E-Co System for Ford Cars.

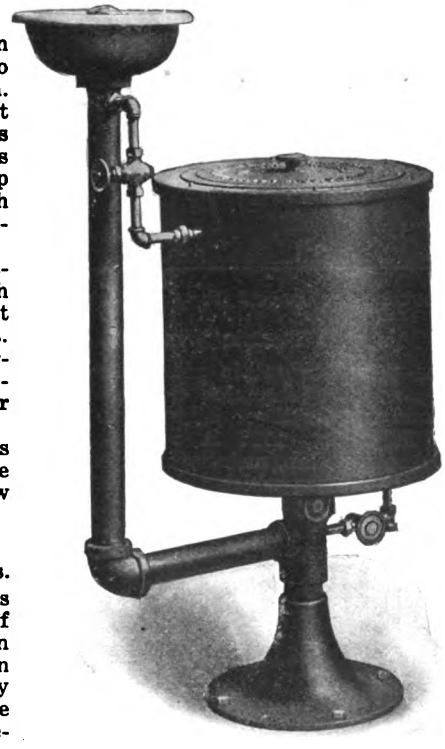
The Gas-E-Co system for Ford cars is a device for increasing the power of the car, also reducing the consumption of gasoline and eliminating the carbon trouble, which is such a nuisance on any car. This system includes a needle valve control which automatically reduces the consumption of gasoline in proportion to the demands on the engine and insures smooth running, also a vaporizer which serves as an auxiliary mixing chamber and automatically maintains the maximum efficiency of the gas at all engine speeds.

Another feature of this system is the decarbonizer which automatically supplies the engine with the moisture necessary to produce the maximum of power and to totally eliminate carbon. It is stated that there is always a fat spark on Gas-E-Co equipped Ford cars, because the spark plugs are always clean, and it is also claimed that this system will increase Ford mileage an average of 30 per cent. This device is sold for only $10.00 at retail with parcel post charges fully paid and also with a full money back guarantee. Readers who are interested should write for an interesting free booklet covering the subject of air mixture, vaporization and decarbonization to the manufacturers, the Gasoline Economy Co., 1103 Colonial Trust Building, Philadelphia, Pa. The same company also has an attractive proposition for dealers desiring to handle an article that is a wonderful good-will producer and that sells itself in any community where it has been introduced. Dealers should write for the special selling plan which has been adopted by this manufacturer.

Bubbling Fountains.

The wise garage man looks to the comfort of his employees for he realizes that as long as they are satisfied they will do their best work for him. Personal comfort is of prime importance and the garage drinking water supply should be carefully looked after. Illustrated herewith is a device manufactured by the Manufacturing Equipment & Engineering Company, Framingham, Mass., which may be attached to the municipal water supply in any garage and is made in a number of styles either plain or ice cooled.

The illustration shows style number



One Style of Bubbling Fountain.

604, which is arranged to take 75 pounds of ice in a cork insulated refrigerator box.

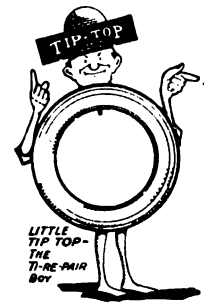
Hi-Comp Piston Ring.

The heavy fuel problem is the biggest which confronts the motorist today and in order to obtain efficiency from an engine it is necessary that the piston rings prevent all passages of gasoline into the base. With the leakage of fuel past the rings comes another serious problem, that of dilution of the lubricant. The motorist then should be doubly careful in obtaining piston rings which fit the cylinders and do not allow the passage of gas into the base.

A ring, which is said to be efficient, is manufactured by the Continental Piston Ring Company of Memphis, Tenn., and termed a Hi-Comp piston ring. This device is made in two parts and is so designed that an even pressure is maintained around its circumference. A special process grade iron is used as material for the rings and each ring is tested by micrometer examination.

"Little Tip-Top" Advertising Figure.

The little figure at the left is becoming familiar to readers of the Automobile Dealer & Repairer through its use



by the Akron Rubber Mold & Machine Co., in their advertisements of Tip-Top Ti-Re-Pair Outfits.

This is one of the most unique and effective advertising characters now being run in the automobile publications, and in addition to attracting attention to the Tip-Top vulcanizer equipment, becomes readily remembered by readers and at once identifies this particular make of equipment wherever its advertisements are seen.

"Little Tip-Top" is said by the manufacturers to stand guard over the quality of Tip-Top Ti-Re-Pair equipment and in a sense this is true, as the manufacturers of a product that is advertised to be exceptionally high quality use the greatest care to see that their product lives up to its reputation.

Krom Nik Gears.

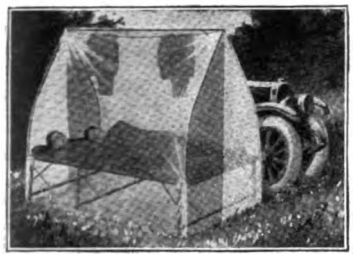
In remodelling the car for the coming season the owner as well as the repair man should investigate differentials and gears manufactured by the Krom-Nik Gear Company of Chicago, Ill., advertisement is given in this magazine. This company makes special gear ratios as well as differentials. The material used in the construction is of the best and our readers are requested to write this firm for details of their products.

Tentobed.

One of the reasons why automobile camping is not generally popular is because of the fact that the automobile is limited as to room and therefore a large car is necessary to carry the camp equipment. This objection does not hold true as regards the Tentobed manufactured by the Tentobed Company, 3422-3426 W. Lake Street, Chicago, Ill. This combination consists of a complete tent, 4 ft. wide by 6 ft. 4 in. long and a large bed for two adults. The complete outfit weighs 145 pounds and may be rolled

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nto a package only 7 inches in diam-
ter and 4 ft. long. No stakes, ropes or
oles are required for pitching the tent
nd the material used is said to be wa-
er, mildew, mosquito, and insect proof
The outfit requires but five minutes in
etting up and is entirely self-support-

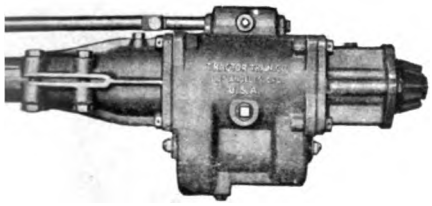


The Tentobed.

ng. Automobile owners should consider
he advisability of spending their vaca-
ion in the open air, this year, and the
Tentobed proposition should be of great
nterest to all.

Auxiliary Transmission for Fords.

Many Ford car owners fit their cars
or express or truck duty without con-
idering any changes in the transmis-
ion. The Ford transmission was de-
igned for passenger service only and
or heavy pulls and great loads such as
re had in trucks, it wears very rapidly.
To obviate the constant expense of
eplacement and repairs to the car, the
ractor-Train Co. of 1347 Wall St., Los
ngeles, Cal., have put on the market
ie Moore Auxiliary Transmission. This
evice is attached to the car between
ie gearset and rear axle and is a sec-
nd gear box containing special gear
atios to be used together with the
gular Ford transmission.
For heavy pulls in sand or mud the
uxiliary transmission may be used to
ve more power to the wheels in the
ape of a speed lower than the present
ord low. It may be used to give a
wer reverse ratio, or a lower high
eed. In the latter case, a hill which
too steep for the Ford high may be
egotiated with the intermediate had by
e combination of the auxiliary and
ord high speeds. In other words, the
oore transmission offers a set of
eeds lower than the three on the car;
the same time, however, the regular
tios are at all times available.
The device is easily applied and few



Moore Auxiliary Transmission.

anges are necessary. No welding or
azing are required in applying the
uxiliary transmission.

Holtzer Cabot Magnetos.

There is no part of a car's equipment
important as the ignition system. No
atter how good the car is, a poor ig-
ion system results in inefficient action
d a waste of fuel. Car owners who
e having trouble with their present
ignition systems and desire to change
should investigate the complete line of
magnetos and spark coils manufactured
by the Holtzer Cabot Electric Company,
Park Avenue and 40th Street, New York,
N. Y. This line includes many types of
machines either for direct drive or
through a governor by friction from the
flywheel.

Workrite Battery Outfit.

The car owner is beginning to wake
up to the fact that his storage battery
is a very important part of the automo-
bile. He realizes that the starting,
lighting and ignition systems all depend
on the proper functioning of the stor-
age battery, and therefore he is edu-
cating himself to pay particular atten-
tion to this unit. One device which he
needs above all others is the hydrometer,
for with this he tests the electrolyte
and finds the general condition of the



Workrite Battery Outfit.

battery. Such a device is made by the
Workrite Manufacturing Co., 5606 Euclid
Avenue, Cleveland, Ohio.
This product is interesting because
of its construction. It is really a com-
bined hydrometer and battery filler. The
glass tube is fitted at one end with a
large red rubber bulb and at the other
with a filler tube. At the filler end a
large square rubber washer is furnished.
Contained in the filler is a hydrometer
accurately marked. The washer at one
end and the bulb at the other prevent the
filler tube from coming in contact with
the bench upon which it might be placed
and should it fall upon the floor, the
glass portion is protected by the rubber
pieces. In order to keep dirt away from
the device as well as to furnish a re-
ceptacle for distilled water, a glass bot-
tle is provided and upon this glass bot-
tle are placed directions for battery
maintenance. The whole outfit is well
worth investigating either by the garage
man or the repair owner.

Smith Auto Signal.

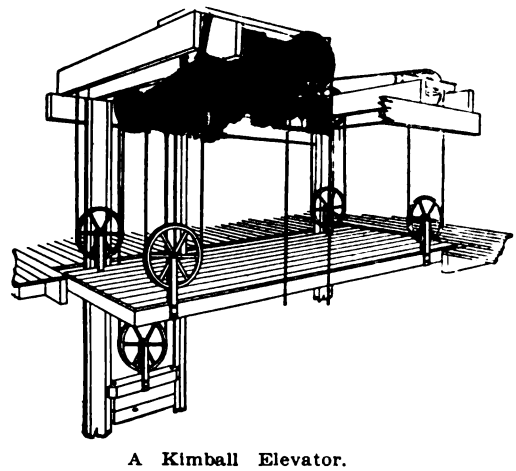
Beginning May 1, 1918, the firm of
Weiss and Sinclair took over the United
States distribution of the Smith Auto
Signal. They will give their exclusive
time to the promotion and sale of this
device.
They are now located at 42 West 39th
Street, but expect in the near future to
move their offices and force to the plant
of the Smith Signal Corporation, 53-55
West 66th Street, New York City. The
location of this sales organization at the
same place as the manufacturing plant
will keep both departments in closer
touch with each other and enable them
to better co-operate with old customers
as well as the new ones.

The All-Car Unit Company.

The production of passenger cars has
been cut badly this year and evidence
would go to show that the output of
trucks is as greatly diminished as is the
manufacture of passenger cars. For
this reason this year will see the con-
version of many passenger cars into
trucks; consequently there will be a big
demand for conversion units of all types.
The All-Car Unit Company, 1405 Real
Estate Trust Bldg., Philadelphia, Pa.,
are manufacturing a conversion unit
which is especially interesting in that it
is applicable to many of the passenger
cars now on the market. This unit is of
excellent construction and designed for
heavy work. The axle is of the internal
gear type and fitted with semi-elliptic
springs. The frame is made of heavy
steel channel stock well braced and rein-
forced at the corners. Dealers who are
interested in obtaining the agency for
this unit should write to the manufac-
turers.

Kimball Auto Elevators.

Many garages are badly handicapped
because they are limited as to space
for cars. They may have plenty of
room on the second story of the plant,
but none downstairs. Where this is the
case the garage man would do well to
inspect the line of auto elevators being
manufactured by the Kimball Brothers
Co., of Council Bluffs, Iowa. These ele-
vators are manufactured in many differ-



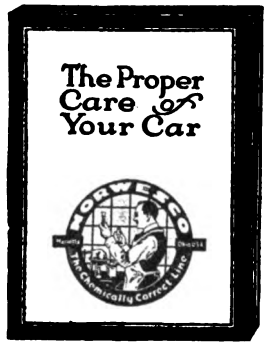
A Kimball Elevator.

ent sizes for hand or electric operation
and by installing such an elevator you
figuratively move the second story down
to the ground level.

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Proper Care of Your Car.

Quite in line with the nation's plan of conserving and preserving is the attractive twenty-four page booklet "The



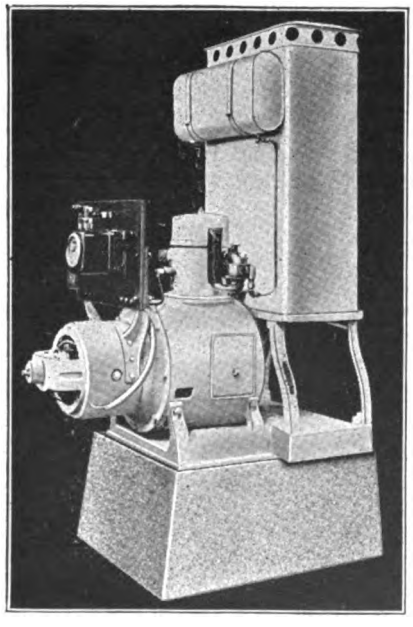
Proper Care of Your Car," published by the Northwestern Chemical Company of Marietta, Ohio, manufacturers of the "Chemically Correct" line of Norwesco utilities.

This booklet is chuckful of practical hints for the motorist. It tells how to overcome and to correct some of the different ails a motor car is subject to. Unlike some booklets, it gives more than one remedy for correcting the most common troubles. In fact, it tells just what its name implies "The Proper Care of Your Car."

It is well illustrated and any motorist will find it serviceable and helpful. The readers of Automobile Dealer and Repairer can secure a copy postpaid by writing the Northwestern Chemical Company, Marietta, Ohio.

Unit Electric Plant.

The Gile Tractor & Engine Company of Ludington, Michigan, has standardized under quantity production a real utility size of electric plant—big enough for the average home and a price that is only possible where the plant is built



A Unit Electric Plant.

under one roof from foundry to paint shop.

In order to further reduce the cost of this plant an arrangement has been made with the Consolidated Utilities Corporation of Chicago to distribute it through their organization.

The rating of this machine is 600 watts, the engine is of the valve in head 4-cycle water-cooled type and operates at a speed of approximately 1,600 revolutions per minute.

The generator has an output of from 32 to 40 volts and is fitted with a controller and government arrangement if desired. The plant is self-contained and complete in all respects and may be used either for house lighting or for battery charging as desired.

A Stringent Screw-Driver Test.

With the unprecedented labor shortage, thousands of laymen are turning to mechanical occupations and naturally their knowledge of tool quality is limited as compared with that of the expert. Unimportant as the screw-driver seems to be, it is one of the most used tools in the mechanic's kit, and consequently has to bear the brunt of the amateur's bunkling.

A test was recently given a stock



A Stringent Screw-Driver Test.

Yankee screw-driver which seems to prove that this product made by North Bros. Manufacturing Co., Philadelphia, Pa., possesses great merit. One of the salesmen took a heavy sledge hammer and from it he chipped the trade-mark letters, using a Yankee screw-driver No. 90 and a one-pound driving hammer. After doing this he laid the blade flat, hammered a slight bend in it and resumed cutting. Following this he straightened the blade out again and smashed his hammer down upon it endwise. After this severe trial the handle still remained firm upon the blade and the blade was in good condition for use under ordinary conditions.

Bulb Tester.

The Metal Specialties Company of Chicago has introduced a new accessory that has made a pronounced success. This article is the Presto Bulb Tester.

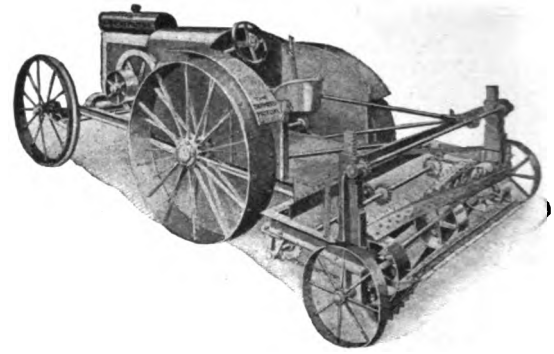
This is a Bulb Tester for testing all sizes of automobile light bulbs with Ediswan base. When a dealer sells you an electric light, he will test it right before your eyes, showing that the bulb is good and proving to your satisfaction that you are getting the right bulb and a good one.

It tells you instantly whether the bulb is burned out or not. The lever switch has different contact points for one and one-half volts, three, six, nine and twelve-volt bulbs. It attaches to any ordinary 110-volt lamp socket. Equipped with seven feet of lamp cord. It is enclosed in a neat metal case, black enameled with nickel-plated trimming. Every live dealer has a Presto Bulb Tester so that he may test all the bulbs he sells you, and when you buy a bulb tested in this manner you know that the voltage is exactly what you are paying for and that the bulb is perfectly good.

Currier Rotary Tiller Plow.

All garage men should investigate the possibilities offered in the field of tractors, and especially the proposition of the Farmer's Mutual Plow and Tractor Company of St. Louis, Mo. This Company's product is termed the Currier Tiller Plow and is especially interesting because of its low price. The weight of this machine is but 110 pounds, yet this is said to do the work of three men and reproduces the handwork of a hoe.

This machine is fitted with a four-cylinder oil-burning engine, the power from which drives directly through the rotating blades at the rear. The propulsive power is obtained through the rotation of these blades which operate upon the principle of a lawn mower. The



Currier Rotary Tiller.

blades are made in sections so that in case of breakage one or more may be replaced without changing any of the others. The manufacturers are putting this machine on the market at a very low price and it should attract considerable interest among the small farmers.

High Tension Magneto for Ford Cars.

A trouble which frequently bothers the Ford owner is often caused by the ignition system. This trouble is particularly noticeable upon the older models and may be obviated by the installation of a high-tension magneto. Such a device may be purchased from the Magneto Parts Company, 1790 Broadway, New York, N. Y., at a very nominal figure. This high-tension magneto attachment has been designed especially for Ford cars and is so designed that it may be put into place on the front of the engine in a very short time. With this attachment any of the standard high-tension magnetos may be used.

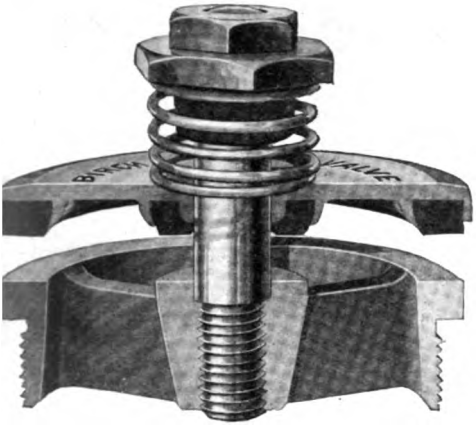
General's First Aid Kits.

The General Tire & Rubber Co., of Akron, Ohio, have introduced a war-time tire accessory that is said to be in great demand among automobile owners. In their first aid kits, the car owner receives an all-rubber patching material that enables him to keep his tires in condition. These kits are made in three standard sizes, any one of which contains material for mending tubes, automobile tops, or other rubber articles.

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Birch Pump Valves.

Illustrated herewith is a cross-sectional view of the Birch Pump Valve manufactured by Birch-Hintz Mfg. Co., 1100 So. Kilbourne Avenue, Chicago, Ill. As the illustration indicates, the valve portion is made in two parts. The lower or seat part is ground to a perfect face and heavy enough to withstand pressure strains without being distorted. The upper portion is fitted with rubber faces



Cross Section of Birch Pump Valve.

which are cured separately and securely locked in the body by a rolled metal lip. The two portions are held together by a stud upon which is mounted the spring which may be of barrel, spiral or beehive type. This valve is made in many sizes for various standard types of pumps. For further details write the manufacturers.

Butler Pistons.

The Butler Manufacturing Company of 1121 E. Georgia Street, Indianapolis, Indiana, are manufacturing a lightweight, semi-cast, as well as a standard cast-iron piston in both standard sizes and in oversize, together with piston rings and wrist pins, a line which should be investigated by repair men. This firm also does cylinder regrinding and piston fitting for all makes of cars.

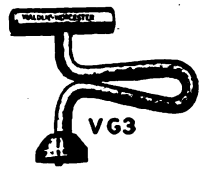
Two Excellent Repair Tools.

The A. & H. Mfg. Co., Inc., 505-507 West 45th Street, New York City, are the manufacturers of the A. & H. true threader tool. This tool is said to recut absolutely true the worn threads of a leaking tire valve and make it airtight. The device takes up less room in the tool kit than a pair of pliers. It is made of the highest quality material, automatic adjustment, and no skill is required to use it. The retail price of this tool is $1.50, but it is worth many times more than its cost to the tourist every time it is needed, as it saves tires, time and money.

The same company has now brought out another tool called the A. & H. valve repair tool, which is really a wonder. With this repair tool one can recut outside stem threads, take off hexagon nuts, remove broken plungers, ream off rough nipples, recut inside plunger threads, recut outside nipple threads and take out plungers. This tool is endorsed by all the leading tire manufacturers and just now the A. & H. Mfg. Company is making a special offer to furnish this valve repair tool described above in a combination offer of $2.00 for both tools. Readers should carefully inspect the advertisement which appears for the first time, from this company, in this magazine and then send orders and inquiries direct to the manufacturers.

Valve Grinder.

The Walden Worcester, Inc., of Worcester, Mass., put out a very interesting line of special wrenches and tools for automobiles and we want to call the attention of our readers to one of their devices which is designed for Ford cars in the shape of a wire handle valve

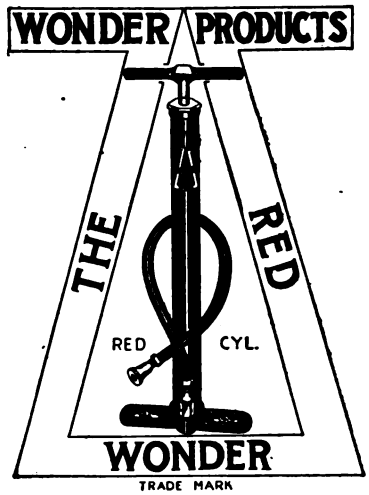


Valve Grinder.

grinder. This device is said to be the first of its kind ever made and sells for an exceedingly low figure. The wire handle is fitted with a 5/16-inch bar handle swiveled on a cone bearing. The other end is fitted with a socket which carries two hardened steel pins designed to fit Ford valves.

The Red Wonder.

Tire trouble is one of the annoyances that no automobilist is free from; and this annoyance is doubly aggravating if

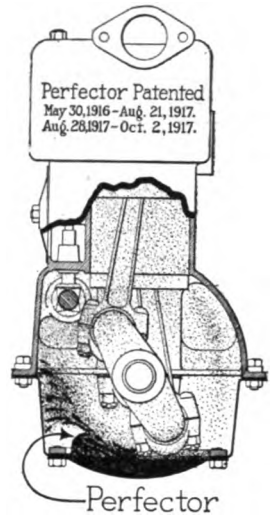


one does not have an efficient tire pump. The Red Wonder tire pump, made by Sidel-Rattner Mfg. Co., 14-18 Dunham Place, Brooklyn, N. Y., is said to be 100% efficient because of its excellent construction. This product is well constructed; the cylinder is made of heavy gauge steel, threaded into a heavy foot base. The valve is of solid brass, equipped with an indestructible flexible seat of special construction and claimed to be dirt proof and air tight at all times.

The piston is of patented design and fitted with a chemically treated cup leather, which makes for efficiency without excess friction. The pump is finished in japan and baked a glossy red while the handle is black enameled. All fittings are of solid brass.

Perfecto Ford Oiling System.

A very useful accessory has recently been invented and patented by E. M. White for perfecting the oiling system of the Ford engine. This device is very simple and free from all moving parts and is secured to the lower part of the crank case by small bolts. It is fitted with a curved surface which extends upward toward the crank shaft and which intercepts and deflects downward, the ex-



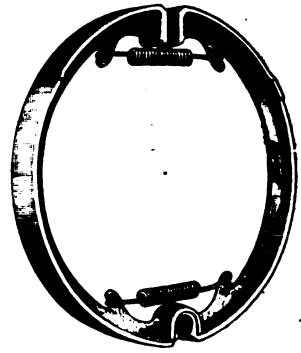
Application of the Perfecto Oiling Device.

cess and larger particles of oil splashed from the cranks by the connecting rods. The perfector has an atomizing effect upon the oil and instead of throwing the oil directly into the pistons, the base and cylinders are kept full of a fine oil vapor of high lubricating efficiency. This reduces the fouling of the spark plugs, the carbon deposits and makes for a properly lubricating engine. The device may be installed in a very short time by any ordinary mechanic, and is said to solve the problems of lubrication in the Ford engine.

The device is manufactured by the Perfector Manufacturing Co., Baker-Detwiler Bldg., Los Angeles, California.

Ford Brake Shoes.

The Adamson Manufacturing Co., East Palestine, Ohio, are marketing special Ford brake shoes which are guaranteed to give satisfaction. These brake shoes are made in two types, one unlined and the other lined with asbestos which has wire insertion and is riveted to the shoe. The faces of the shoes



Adamson Ford Brake Shoe.

which are in contact with the cam are specially hardened to prevent them from wearing out of true, and this is said to add materially to the life of the shoe.

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Tasgon Liquid.

Every car owner as well as every repair man realizes that more time is taken for hauling a machine to pieces than for actually putting it together, the reason usually being because of the fact that collections of dirt and rust prevent the removal of nuts and bolts. The Polygon Products Company, 141 Market Street, Boston, Mass., manufacture an interesting product which they term "Tasgon." This product is said to remove rust in all forms from machine parts. For this reason it may be used very effectually on rusty nuts and bolts for removing the corrosion before they are pulled apart. In addition to this, the liquid may be used in springs and hinges to stop the squeaks. The manufacturers also claim that Tasgon will prevent carbon from collecting in the engine cylinders if properly used.



Using Tasgon Liquid Rust Remover.

Smooth-On Instruction Book.

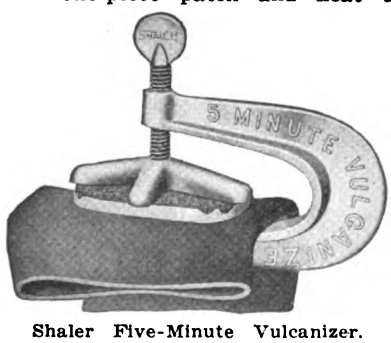
The 16th edition of the Smooth-On instruction book has just been issued by the Smooth-On Mfg. Co. of Jersey City, N. J., and this book contains 144 pages of information relative to the use of this product.

The various uses of Smooth-On Iron Cements are shown and any of our readers may obtain a copy by writing the manufacturers.

Shaler 5-Minute Vulcanizer.

There is no doubt that the best results in tire repairs are obtained when the patch conforms with the shape of the cut. A puncture should be patched with a round piece of rubber, while a cut should be repaired with a long narrow patch. The 1918 Model Shaler 5-Minute Vulcanizer made by the C. A. Shaler Co. of Waupun, Wis., is so designed that with it, both round and oblong patches may be applied.

The one-piece patch and heat unit assortment consists of the solid fuel, the vulcanizing plate, and the patch of raw rubber. The latter is of special construction, and with the fuel is protected against deterioration while in the dealer's stock or in the tool box of the car. Six each of the oblong and round patch units come with each outfit.



Shaler Five-Minute Vulcanizer.

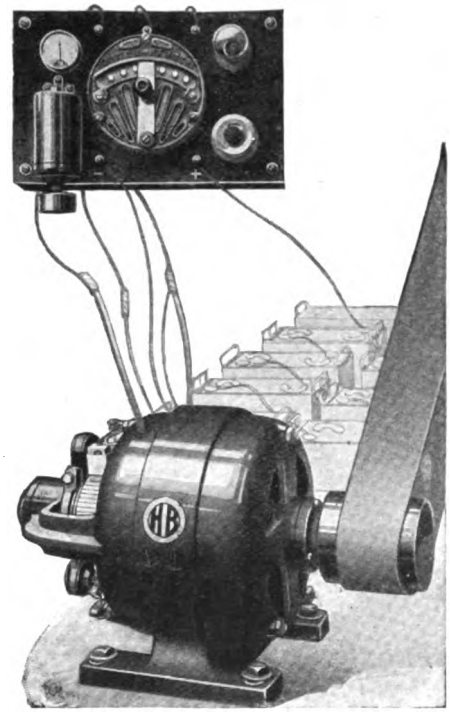
The vulcanizer is substantially made of iron with ample strength to prevent breakage, and finished with a coat of rust-proof nickel.

The manufacturers run a printing department to supply dealers who carry the Shaler line with ample quantities of advertising matter.

The H-B Belted Charger.

Many garagemen throughout the country are desirous of installing battery charging outfits and the garage man who is anticipating such a step should investigate the H-B line of charging apparatus, manufactured by Hobart Bros. of Troy, Ohio. For the garages which do not have electric current the H-B belted charger should be of interest.

This device will charge seven 6-volt batteries or their equivalent at one time. It is operated from a line shaft or the engine, and requires approximately one h.p. With the device is furnished a switchboard fitted with an ammeter, a field rheostat, circuit breaker, pilot light and necessary fuses and cut outs. The machines may be obtained for cash or upon easy payments. In this latter method the garage man may pay for the apparatus from the profits of the business.


H-B Belted Charger Outfit.

The Bowers Magnet Tester.

This is a clever device which is really a combination magnet, compression and air pressure testing and indicating gauge. This invention was illustrated in the April issue of this magazine, but by an unfortunate error it was stated that this magnet tester is manufactured by the Bowers Mfg. Company of Grand Rapids, Mich. As a matter of fact the factory of the Bowers Mfg. Company is located at Grand Rapids, Minn., and readers who are interested in this device should write to the Minnesota town and not to the Michigan city.

Evr-Lastin Gear Compound.

A product which is said to make very efficient lubrication is manufactured by the Imperial Oil Company, 3140 Locust Street, St. Louis, Mo., and called Evr-Lastin Gear Compound. This is said to be a truly remarkable product and when in use in the transmission or differential it forms a thick protective coating that will not run or gum, preventing wear and assuring perfect lubrication. This product is said to be excellent for lubricating axles which are old and leaky, for it does not leak into the brake-bands. It is put up in 5, 10, 25, and 50-lb. tins; also in 225 and 400-lb. barrels.

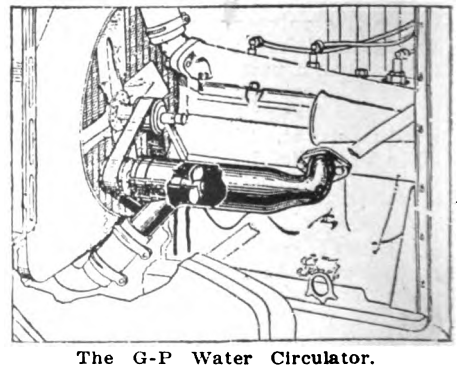


Bull Dog Tire Patch.

The Iowa Tire Patch Company, Department A, Des Moines, Iowa, manufacture an interesting product called the Bull Dog Tire Patch which they guarantee to give satisfaction, if used according to directions. This patch consists of two plys of the best quality of raw red rubber, one ply of semi-cured rubber and a fabric backing which adds strength and durability. In applying the patch, no tools or heat are said to be necessary and the manufacturers claim that a patch may be applied in three minutes and the tire used immediately, without further work.

The G. P. Water Circulator.

In this issue the reader will notice a story dealing with the remodeling of a Ford car for speed work and he will find that there has been suggested an auxiliary water pump for circulating the cooling medium. Such a device is made by the Firestone Sales Company, 1806 So. Michigan Avenue, Chicago, Ill., and is illustrated herewith. This device consists of a fan pump mounted in a special casting which is applied in place of the present Ford water hose. The circulating fan is driven from the regular Ford fan and crank shaft. The device is easy to apply and is said to be very efficient.


The G-P Water Circulator.

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RAYFIELD CARBURETORS

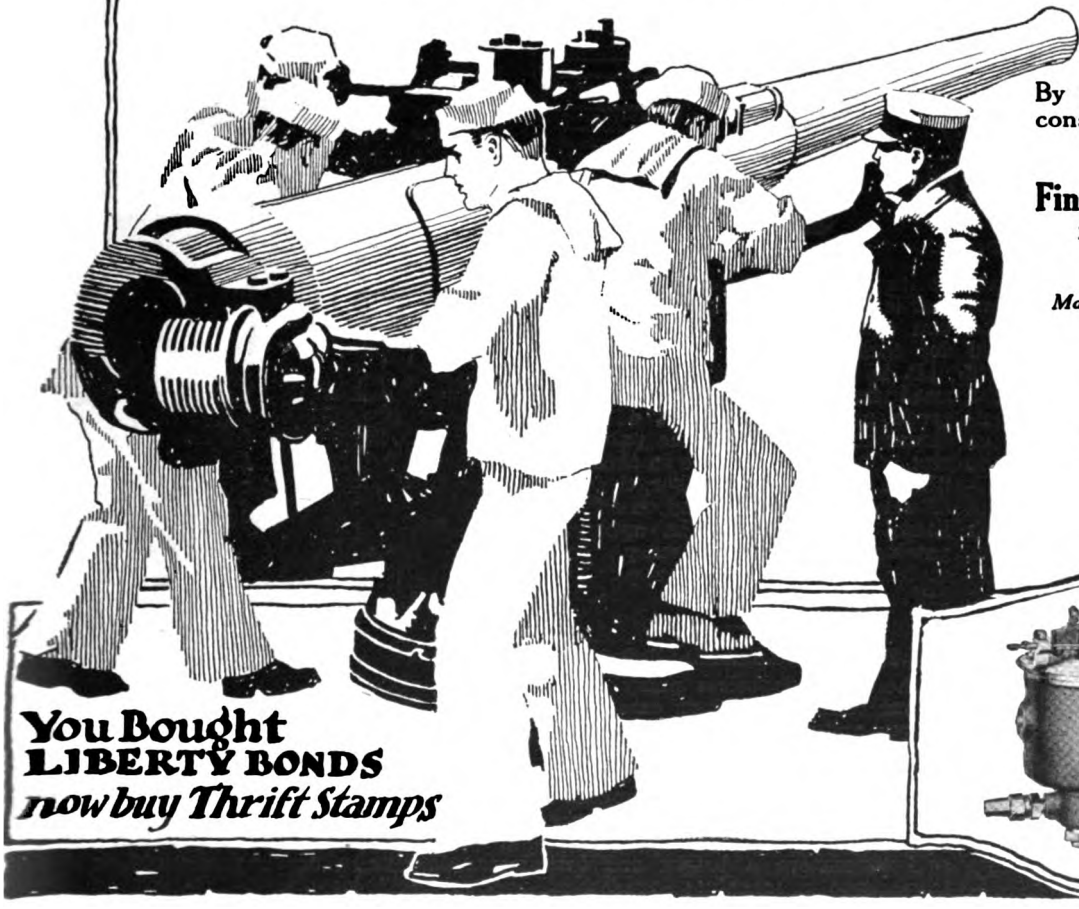
Clear for Action!

We are in this war to win. You can again help. When needed, the resources of our company will be placed unreservedly at the service of the Government.

Up to the present time, war demands have interfered but little with the production of RAYFIELD Carburetors.

However, any day may bring about big changes.

We are ready to do our part—to make a thorough job of it, we need your co-operation. By placing your order for the RAYFIELD today you will help us to ***clear the decks*** for Government requirements. Also you bring your car up to war standards, for the **RAYFIELD equipment means economy and efficiency.**



You Bought LIBERTY BONDS *now buy Thrift Stamps*

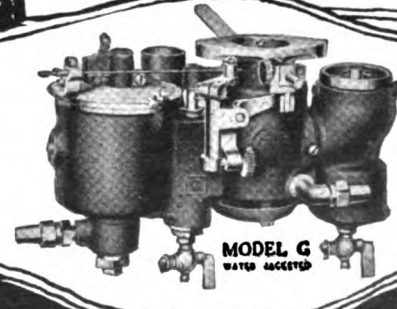
By practicing econony, you conserve for the Government.

Fin leisen & Kropf Mfg. Co.
21st and Rockwell Streets
CHICAGO

Manufacturers of the RAYFIELD Carburetors—

"The World's Best"

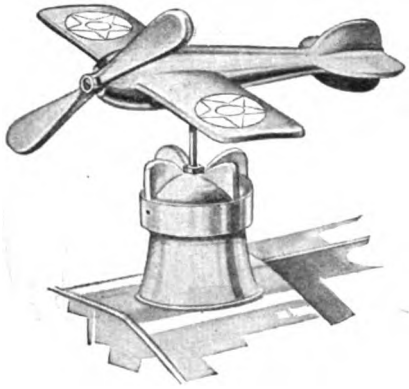
Service Stations Everywhere



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The Liberty Plane.

The Defender Auto Lock Company, 506 Marquette Bldg., Detroit, Michigan, are putting on the market an attractive radiator ornament which is a miniature

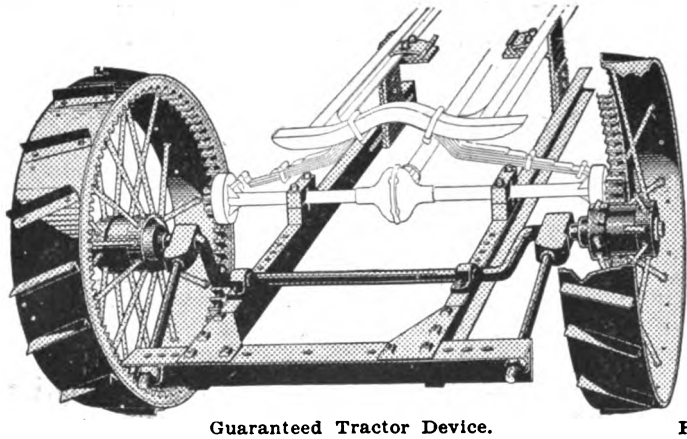


The Liberty Plane.

of an aeroplane. This device is cast in aluminum and is highly polished and decorated with the flying emblem in red, white and blue enamel on each wing. At the front is a propeller mounted in such a way that the slightest breeze causes it to revolve.

Guaranteed Tractor.

Now that spring is here, the farmer faces a situation which is unprecedented, for labor at this time is exceedingly difficult to obtain and the average farmer finds himself unable to cultivate all of his land without suitable farming implements. The answer to the question is "farm tractors," and should the farmer own an automobile he would do well to investigate the Guaranteed Tractor, manufactured by the Guaranteed Tractors, Inc., 2700-02 Michigan Avenue, Chicago. This device may be had to fit practically any of the standard automobiles now on the market and consists of a heavy frame upon which is mounted two large tractor wheels. The large wheels are fitted with internal cast gear teeth and the device is bolted upon the rear axle of the car after the wheels have been removed. In place of the wheels two spur gears are attached and these operate upon the tractor wheels through the internal gears. The guaranteed tractor device is so designed that it may be applied in a very short time and in this way the car may be used for passenger purposes as well as tractor work. Dealers and garage men should investigate the device, for a sideline of this sort especially at this time is very practical.



Guaranteed Tractor Device.

Revere Chassis.

A machine which bids fair to attract considerable notice this coming year is being turned out by the Revere Motor Car Corporation, 1638 Monadnock Block, Chicago, Ill.

A glance at the specifications shows many interesting features. The engine is a Deusenberg four-cylinder and had in two sizes, developing either 96 or 103 h.p. The oiling system is by pressure and arranged so that it may be adjusted as to height. For ignition, a Bosch high tension magneto is used. The clutch is of the multiple dry disc type, the discs being faced with a non-burn composition. A four-speed and reverse transmission is bolted to the engine unit and from it a power is transmitted to the rear axle through two universal joints. A full floating type of rear axle is used, fitted with helical cut bevel gears and standard roller bearings. Ample braking capacity is provided by two 16-inch brake drums. The steering gear is of the worm and gear type. Four types of bodies are to be had in 7, 5, 4 and 2 passenger arrangement.

Johnson's Hastee Patch.

Motorists will be glad to learn that S. C. Johnson & Son of Racine, Wisconsin, have just put on the market a new tire repair patch in three handy sizes. This product is termed the Hastee Patch and the makers claim that it is as quick as its name indicates. The patch material is put up in strips so that the user can cut just the size patch he needs for each repair.



Hastee Patch Container.

It is claimed that the tube may be used immediately after the repair is made and that the heat of the road serves to amalgamate the patch on the tire. The patch is made in three layers; first a layer of raw rubber, then a layer of vulcanized rubber, and on the outside heavy khaki fabric. In applying the patch no cement is necessary. The only material used besides the patch is the self-vulcanized liquid.

Panvar Automobile Refinisher.

There are doubtless many thousands of our readers who own cars both passenger and delivery machines who are anxious to have their cars appear neat and clean at all times, and we want to direct their attention to a product manufactured and sold under the registered trade name of Panvar. This product is said to restore a bright and lustrous appearance to machines in cases where the finish has become dull, worn-looking or weather beaten. It is not intended for cars having the paint or body coat damaged for such cars require repainting.

Panvar may be used upon any paint, leather and upholstering and is applied with a soft brush. It is self-flowing and will give a smooth even coat upon the surface. The manufacturers claim that the product has great covering powers and therefore a quart can will refinish an ordinary car completely, including the tops and the sides with one coat.

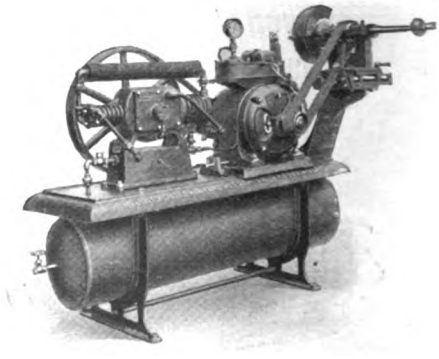
It is quick drying and is claimed not to crack, peel or turn white from the use of water or steam. In refinishing the car for the summer season, we would suggest that our readers investigate this product. The Panvar, sixth floor of the Evening Bulletin Bldg., Philadelphia, Pa., will be glad to mail a sample of their product to all interested parties and they suggest that every garage man or dealer in cars write them for they have an interesting proposition to make.

Air Compressor Unit.

The United States Air Compressor Company of Cleveland, Ohio, which has been responsible for a number of new and very marked improvements in air compressor construction, has just developed a new machine unlike anything now on the market.

Realizing the need in garages and tire shops for an air compressor and a buffing or grinder head this company saw an opportunity of combining the two, thereby making a machine that would afford a number of advantages. The usual method is to buy the air compressor and buffer head separately with an independent motor for the operation of each machine.

The new United States machine combines the buffer and air compressor in one rigid unit, so that either may be operated independently or both at the same time by one motor. The motor is of one horsepower instead of the usual one-half horsepower size, which provides power for the most severe loads and it is completely enclosed to prevent entrance of dust or grit from the buffer. The pulley which operates compressor and buffer head are placed at opposite ends of the motor so that the load is equally divided. The buffer handles two eight-inch wheels and power is applied to it by turning a small hand crank. An automatic controller prevents overcharging of air tank and the entire machine is said to be as nearly fool proof as it is possible to construct.



Air Compressor Unit.

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Cork Insert *takes hold* at the Slightest Pressure

A touch of the toe and the brake *responds*. The Ford comes to a quick, easy stop, without a shake or a jerk. No grabbing and tearing away—hence none of that racking vibration, which ruins the rear end of the car and causes heavy repair expense. It

Stops Ford Chattering

once and for all. Cork Insert Lining never loses its "grip." Never gets hard and glazed. It gives a better driving, surer braking Ford and outlasts two to three sets of ordinary linings.

$3 per Set of 3

No-Slip Fan Belts For Fords

$1.00 for 1917 Fords. .85 for all previous models.



The slip of the ordinary fan belt used with Fords is estimated at 25 to 50 per cent. No wonder the engine overheats! Cork Insert Fan Belts keep the fan turning with the speed of the engine. They always retain their no-slip efficiency. Give exceedingly long service.

DEALERS: Your jobber's salesman will tell you he's selling scads of Cork Inserts. It's repeating, *repeating*, REPEATING. Ford owners are delighted. They say it's the best ever. Enables delivery Fords to pull bigger load. It will pay you to recommend and push Cork Inserts.

Advance Automobile Accessories Corporation, Dept. E 5-1, 56 E. Randolph St., Chicago

Makers also of Cork Insert Brake Linings for all passenger cars and trucks

Dealer's Coupon Check and Mail Today!

Advance Automobile Accessories Corporation Dept. E 5-1, 56 E. Randolph St. Chicago

Enter our order for:

☐ Dozen sets of Advance Cork Insert Transmission Linings for Fords.

☐ Dozen Advance Cork Insert Fan Belts for 1917 Fords.

☐ Dozen Advance Cork Insert Fan Belts for 1916 or earlier model Fords.

Deliver through jobber mentioned below.

Name.....

City ..... State.....

Jobber's Name.....

Ford Owner's Coupon Check and Mail Today!

Advance Automobile Accessories Corporation Dept. E5-1, 56 E. Randolph St., Chicago

Enclosed find $..... Send me:

☐ 1 set Cork Insert Transmission Linings for Fords.....$3.00

☐ 1 Cork Insert Fan Belt (for 1917 Ford)..... 1.00

☐ 1 Cork Insert Fan Belt (for 1916 or earlier Ford model) ..... .85

Name .....

City..... State.....

Dealer's Name.....

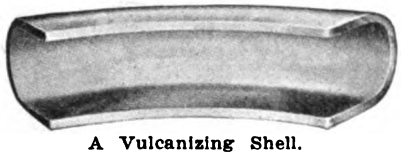
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Light and Power.

With the shortage of labor that exists at present, the farmer and garageman will be forced to utilize more machinery than ever before and dealers throughout the country should investigate the line of apparatus manufactured by the Western Electric Co., Dept. 721, 195 Broadway, N. Y.

Vulcanizing Shells.

The Williams Foundry & Machine Company, Akron, Ohio, report a brisk demand this season for these shells from



A Vulcanizing Shell.

tire repairmen, as they enable the operator to use his larger sectional molds for vulcanizing repairs on small casings, whenever the small molds are busy.

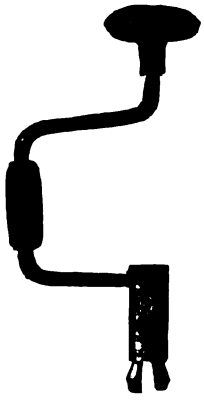
By fitting a shell into a large mold the size of the mold cavity and the shell are machine-finished to a minute degree of accuracy, the shell is in perfect contact at all points, and as good a cure is secured as by direct contact of tire with mold.

These shells enable the repairman who has various sizes of molds to double the amount of vulcanizing on small size tires at nominal expense.

Utility Rim Wrench.

A device which should be of interest to every automobile repair man as well as every automobile driver is manufactured by the Hill Pump Company, Canal and 23rd Streets, Chicago, Ill., and termed the Utility Universal Rim Wrench.

As the name indicates, the wrench is designed especially for the removing of nuts used in connection with all kinds of demountable rims, but can be utilized for many other purposes. In reality it is a socket wrench set in itself for the jaws adjust themselves automatically. It is designed to be operated with both hands and has the same action as does the carpenter's bit brace, thus giving great leverage and enabling the operator to make considerable speed. When not in use the wrench end folds inside, and the device may be packed in a tool box.



Utility Rim Wrench.

Security Switch Lock.

No car on the market to-day is as popular among thieves as the Ford. The reason is that this car is so easily disposed of. Every car left on the streets is an easy proposition for the thief, unless it is provided with a suitable lock. An ignition lock is of no value if it can be picked or "shorted" out of the circuit, and the New York Coil Co. of 338 Pearl Street, New York, N. Y., claim that their product, the Security lock, cannot be "shorted."

The device consists of an especially strong alloy metal housing that covers the conventional Ford switch and is fastened to the coil box by heavy screws which are covered by projecting bars when the lock is closed.

The special feature of the device is the grounding device, contained in the locking mechanism. When the key is removed, a coil spring makes a ground contact with the central member of the switch. And the coil remains inoperative as long as the ground is connected,

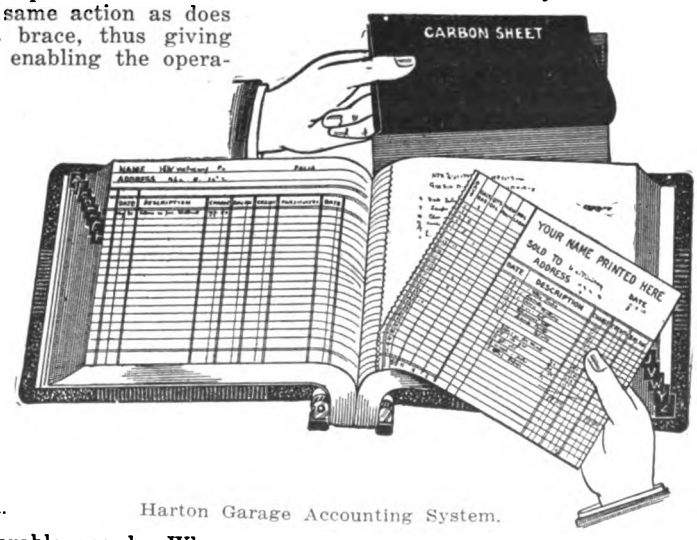


Security Switch Lock.

no matter whether auxiliary batteries are used or special wires from the magneto.

Garage Accounting System.

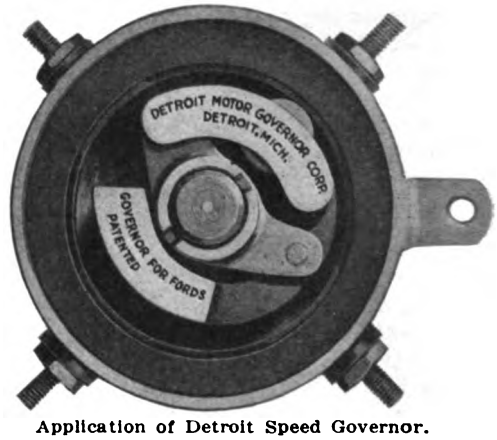
Thomas J. Harton & Co., 212 B Church Street, New York, N. Y., are putting on the market a complete garage accounting system which is said to be complete in every detail and requires but very little attention from the garage man. With this system installed the garage owner may tell at any time just how his business stands yet he is not handicapped by a lot of unnecessary detail work. With this system is furnished complete directions so that anyone without a knowledge of bookkeeping may be able to take up the work and understand it thoroughly.



Harton Garage Accounting System.

Detroit Speed Governor.

There is an ever-increasing need for a simple, reliable method of governing the speed of a Ford engine particularly upon trucks or cars equipped with commercial bodies for the very reason that the drivers entrusted with these machines do not seem to realize that there is a limit to the power of the engine and that to operate the engine above a certain speed with a heavy load results in a rapid depreciation.



Application of Detroit Speed Governor.

The Detroit Motor Governor takes the place of the roller or brush in the Ford engine and is so designed that at moderate speeds contact is made through the timer in the regular way. As the engine speeds up to between 1,400 and 1,600 revolutions per minute, by centrifugal action, the governor breaks the contact and slows the engine down. With the decrease in speed the governor is released again and the engine functions normally. By this means, the full engine power is had for hill-climbing and heavy work, yet the driver is limited to a certain engine speed.

Readers desiring to obtain further details of this device should write to the Detroit Motor Governor Corporation of Detroit, Michigan.

Gasoline Coupon Books.

Few garage men realize that their regular customers purchase gasoline and other supplies at other garages; and there are few accessory salesrooms that control the trade of their regular customers. J. P. Forbes, Forbes Bldg., Coshocton, Ohio, has designed a system, whereby anyone who sells anything pertaining to the automobile, can keep all of the trade of his customers.

Regular customers can be allowed certain discounts on quantity orders, and therefore they may purchase gasoline and automobile supply coupon books, which contain a certain number of tickets redeemable for supplies, at a discount from the regular price. These coupon books may be obtained from J. P. Forbes, in many styles and sizes, all printed and ready for use.

A New Price List on Gasoline Hose.

Interesting because of price reductions shown therein, and rather unique on that account, is a new price list of gasoline hose and couplings just issued by the Metal Hose & Tubing Company of Brooklyn.

It is well printed in two colors and illustrated with half-tone cuts. Anyone can secure a copy if sufficiently interested to write for it.

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(Continued from Page 67)

I think the cause of the small pieces of carbon in the crank case is due to either the piston rings being too loosely fitted or the use of too light an oil. I have found that every time the compression or explosion passes the rings a certain amount of the burned oil and carbon are deposited on the lower end of the piston wall, and in time it will chip off and drop in the oil in the crank case. I have found the small pieces of carbon in the crank case and think that new rings will prevent their formation.

A Letter for Thos. Seary.

From T. D. Birks, Illinois.—I want to give my opinion for Mr. Thos. Seary's trouble, as stated in question number 2357. I believe his trouble lies in a worn low and reverse bronze disc assembly. The discs are so badly worn that the low and reverse transmission lever passes the center and locks. The reason the reverse will not engage is because the discs are worn too thin. The high speed trouble may be due to the fact that the control rod between the pedal and the high speed lever is too short and won't allow the high speed to engage.

To test for this, put the speed lever in high with the foot pedal released, then press on the foot pedal, noting whether the speed lever moves at the slightest touch. If it does, it indicates that the control rod is too short, and this rod should be lengthened by adjusting the lock nut and control rod, until there is one-eighth inch space between the connecting pin and the rod end (head). If the rod is all right, the high speed bronze discs are worn too thin, and the assembly needs filling out. The noise is caused by play in the front transmission housing, due to the fact that the bushing is badly worn, allowing the gear housings and discs to strike.

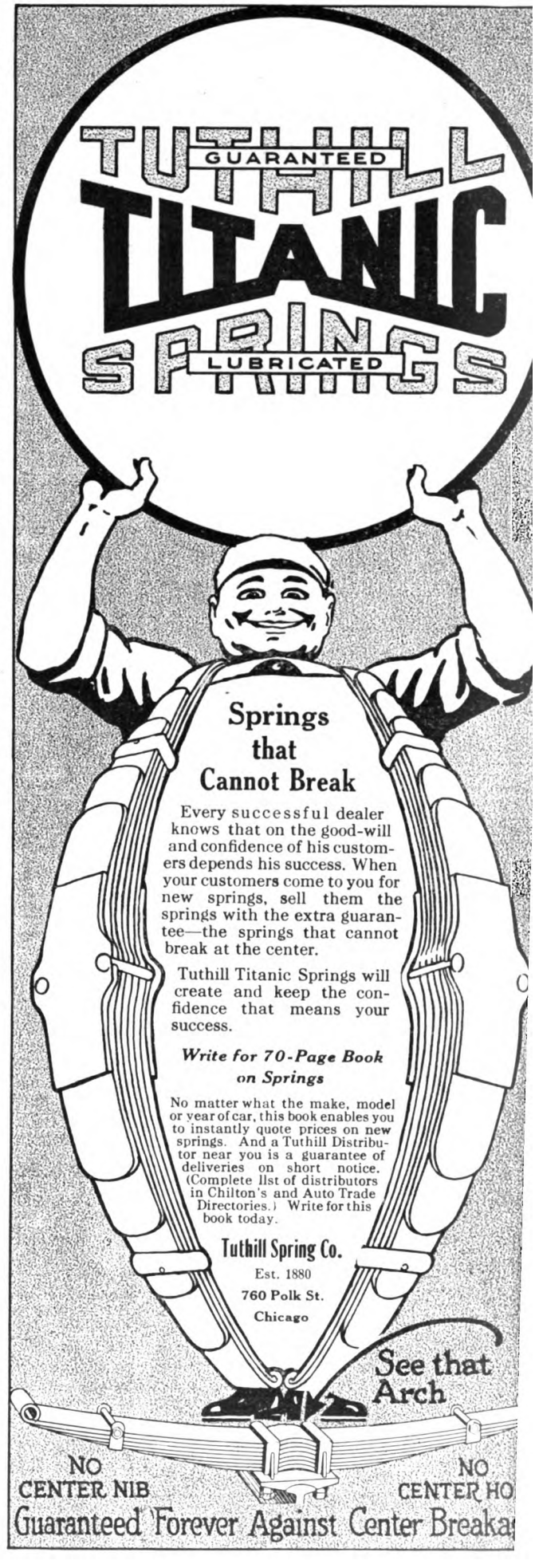
The difference between the Brush and Ford cars is that a Brush car uses three sets of clutch discs but no friction drums. The transmission is much harder to adjust than that of a Ford, which has one set of discs for high speed only, the low and reverse being through friction bands and cones.

SECOND ANNUAL TRUCK, TRACTOR AND ACCESSORY EXHIBIT.

The automobile manufacturers as well as those interested in this and kindred fields are looking forward to the second annual exhibit of trucks, tractors and accessories which is to be held upon the Municipal Pier at Chicago, Ill., from September 14 to 21, inclusive.

This exhibit is under the direction of the Automotive and Accessories Exposition, Inc., and was formerly known as the National Exposition for Ford Accessories.

With one exception, all of the officers are well known business men of Chicago. The President, Mr. J. E. Duffield, is the general manager and treasurer of the Bailey Non-Stall Differential Corpn.; the Vice-President, Mr. I. D. Perry, represents the Perry Auto Lock Co; the Second Vice-President, L. P. Zinke, represents the Zinke Co.; Mr. H. S. Irving, the Secretary, is also secretary of the Howe Mfg. Co. B. L. Gray, President of Gray-Heath Co. is acting as Treasurer. H. V. Buelow, of Toledo, Ohio, the general manager, is the only officer from out of the city.



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Mellin's Gear Shift Extension.

Many drivers find that they have difficulty in changing gears because of the fact that they have short arms and cannot reach the distance required. To bring the shift within reach, the M. & H. Novelty Co., of 857 E. 24th street, Los Angeles, California, manufacture a handy accessory called the Mellin's gear shift extension. This device, as the name indicates, is an extension bar which may be attached to the gear shift arm of practically any car, bringing the control nearly to the driver's elbow.

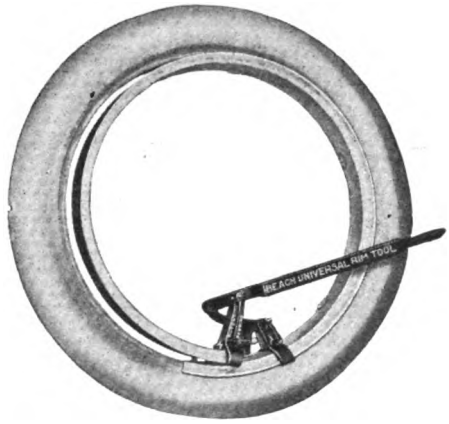
National Cash Register System.

The average garage owner realizes that, with modern competition, he must keep the good-will of the customers. Only by observing eternal vigilance and preventing mistakes is this possible. The National Cash Register Co., of Dayton, Ohio, market a system, in conjunction with their machines, which is particularly applicable to garage and repair shops and is designed to keep the owner in touch with his business as well as to prevent errors.

Beach Universal Rim Tool.

There is a place in the market for a first-class Rim Tool that fits all sizes and types of transversely split rims.

The Beach Universal Rim Tool, manufactured by The Greb Company, 197 State street, Boston, Mass., spreads the rim one-quarter of an inch when it is necessary to do so. It raises one end 2" and carries it over and by the other 4", thereby contracting the rim. The lever swings by center and the spring of the rim holds and locks it in the contracted position so that the tire may be easily removed. After the tire has been repaired and replaced, simply reverse the operation and the rim is forced back to its correct position. It actually contracts and holds the rim, then expands and locks it in its true position in one



Beach Universal Rim Tool.

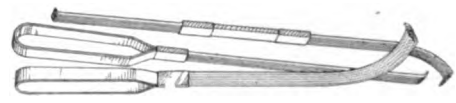
operation without removing or changing the position of the clamps. Quickly attached and all the hard work is avoided. The tool is built of the best of material and will stand up under the abuse that a tool of this type usually gets. The tool comes folded and packed in a small carton that may easily be stored in the car.

Pipe Tools.

The Greenfield Tap and Die Corporation of Greenfield, Mass., have just published their catalog No. 38, which shows the complete line of pipe tools made by their various divisions throughout the country. In addition to the catalog description of pipe tools, the book contains miscellaneous details of information which might interest the average mechanic. Our readers are requested to write for this, which is free to the trade.

Carbon Scraper.

One of the greatest evils that the motorist has to contend with today is the formation of carbon deposits in the engine cylinders. One of the methods of carbon removal is by scraping, and the Flexible Carbon Scraper Company, 1421 West Washington Street, Los Angeles,



Carbon Scraper.

California, are marketing a set of carbon scrapers which are designed to remove carbon formations with a minimum amount of trouble. These scrapers are constructed of flexible material and may be used through spark plug holders or valve cage covers.

New Tire and Tube Factory.

We understand that the Osborne Engineering Co., of Cleveland, Ohio, is drawing plans and specifications for the new factory of the Armstrong Rubber Co., to be located at Garfield, N. J. The present works are at Newark, N. J. This factory will be equipped with the most up-to-date machinery and will have a capacity of 500 tires and 1,000 tubes per day.

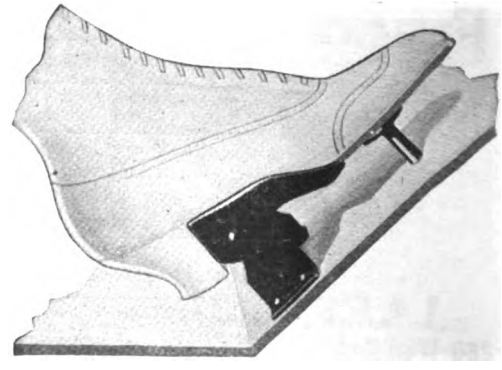
The Stenman Electric Grinder.

A device which has recently attracted considerable attention from garage men is known as the Stenman Electric Valve Grinder and is manufactured by the Stenman Electric Grinder Co., Inc., 42 Southbridge street, Worcester, Mass.

The manufacturers claim that with this device valves may be ground in a minimum amount of time. The valve-grinding shaft oscillates at a rate of about 800 per minute. With the machines are furnished two types of valve tools, fitting it to do practically any sort of valve-grinding work.

Accelerator Foot Rest.

One of the drawbacks which comes with the use of the popular foot accelerator is the attendent muscular strain, had from holding the foot against the pedal. The Hayes accelerator foot rest consists of a neat iron device which is



Accelerator Foot Rest.

designed to fit beneath the instep and is mounted on a hinge casting. This arrangement supports the weight of the foot and protects both the heel of the shoe and the floor mat. It is manufactured by the On Guard Auto Necessities Co., of Detroit, Mich.

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Classified Advertisements

Under this head will be printed advertisements of **Second Hand Cars Wanted or for Sale, Accessories of any kind Wanted or for Sale, Shops for Sale or Rent, Situations or Help Wanted, Second Hand Tools or Machines for Sale or to Exchange,** at the uniform price of **five cents a word,** including the name and address, for each insertion, payable in advance. **No advertisement will be inserted for less than 75 cents, however small.** Remittances may be made in postage stamps or in any convenient way.

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34x4	17.25	19.75
35x4½	24.25	27.00
37x5	28.00	35.00

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20% deposit required on C. O. D. orders.

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223 West 49th St., **New York**

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SPLENDID FACTORY SECONDS

New, Fresh and Clean

Quality Goods Breaking All Records for Sales

Hesitation will not get you anywhere—find out—get the inside information from us as to what Tire Bargains are in the market—First Choice Seconds is the only kind we sell. We have been successfully established since 1907 and there must be a good reason for it.

LOOK UP OUR RATING IN DUN'S OR BRADSTREET'S.

Don't be in the class with "the man who stood still"—get your order in NOW—today—in these times it's worth while to save all the money you can—and the saving is considerable on a purchase of these splendid Tires.

Size.	Plain Tread.	Non-Skid Tread.
30x3	$7.00	$7.50
30x3½	10.00	11.00
31x3½	9.50	10.75
32x3½	11.25	12.50
34x3½	12.00	14.00
31x4	14.50	16.00
32x4	14.50	16.50
33x4	15.00	17.00

Size.	Plain Tread.	Non-Skid Tread.
34x4	$15.50	$17.50
35x4	14.00	16.00
34x4½	22.00	25.00
35x4½	22.25	25.50
36x4½	23.00	26.00
37x4½	22.00	25.00
35x5	24.00	27.50
36x5	24.00	27 50
37x5	25.00	28.00

Caution: When ordering be sure to specify whether regular clincher, Q. D. Clincher or straight side casings are required.

B. LIBEN & COMPANY, **261-A West 54th Street,** **NEW YORK CITY**
Branch: 112 East 110th Street **Phones: Circle 2460; Harlem 3429**

Exceptional Values

IN

DOUBLE CHAIN STITCHED TIRES

Size	Plain	Non-Skid
28x3	$4.50	$5.00
30x3	5.50	6.00
30x3½	6.50	7.75
32x3½	8.00	9.00
31x4	9.00	10.00
32x4	9.00	10.00
33x4	9.00	10.00
34x4	10.00	11.00

Size	Plain	Non-Skid
35x4	$10.00	$11.00
36x4	10.00	11.00
34x4½	11.00	12.00
35x4½	11.00	12.00
36x4½	11.00	12.00
37x4½	11.00	12.00
35x5	11.00	12.00
36x5	12 00	13.00
37x5	12.00	13.00

Have your own tires Double Treaded by the same process. Our charges are only 40% off the above mentioned prices.

Send your order to our nearest office.

LEON JAFFESS, Inc.

252 West 55th Street **New York City**
6106 Euclid Avenue **Cleveland, Ohio**

Double Tread Tires

Notice Our Prices Before Going Elsewhere

PRICE LIST

Size	Plain	Size	Plain
30x3	$5.00	35x4	$9.00
30x3½	5.50	36x4	9.50
32x3½	6.50	36x4½	10.00
32x4	7.00	36x5	10.00
33x4	7.50	37x4½	10.00
34x4	8.00	37x5	10.50
34x4½	8.50		

For Non-Skid, 50 cents more on all sizes.

We Carry a Full Line of New and Used Tires & Tubes

GINSBERG & BERKOWITZ, Inc.

236 WEST 48th STREET, NEW YORK

PRICE WRECKERS

Double Tread Tires with Double Lock Stitch

30x3	N. S.	$5.50		34x4½	N. S.	$8.50	
30x3½	"	6.50		35x4	"	9.00	
32x3½	"	7.00		36x4	"	9.50	
31x4	"	7.25		36x4½	"	10.00	
32x4	"	7.25		36x5	"	10.00	
33x4	"	7.50		37x4½	"	10.00	
34x4	"	8.00		37x5	"	10.00	

We carry a full line of Firsts and Factory Blemished Tires and Tubes at moderate prices.

ROYAL TIRE EXCHANGE

282 Halsey St., **Newark, N. J.**

TIRES & TUBES

Special Lots. Also slight Factory Blemished. Get on our mailing list and receive Trade Prices.

It will pay you to do business with us. Thousands of satisfied customers are sufficient proof of our fair method of doing business.

Write NOW for New Price List

MANUFACTURERS SURPLUS TIRE CO.

789 Seventh Ave., New York City

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Tires

FORD TIRES

30 x 3½

$8.50

BRAND NEW — IN WRAPPERS

Unguaranteed

Name and Serial Numbers On

Send Your Orders First Letter

JANDORF TIRE CO.

1763 Broadway, New York

DEALERS AND BUYERS
Send for prices on Good Factory Seconds.
STAR RUBBER COMPANY
1771 Broadway Tel. 123 Columbus New York City

INSYDE TYRES,
inner armor for automobile tires. Double mileage. Prevent punctures and blowouts. Details free. Agents wanted. Big profits.
AMERICAN ACCESSORIES CO.,
Dept. AD3, Cincinnati, Ohio

Cylinders Reground

ATTENTION

Those Requiring the Very Best in

CYLINDER GRINDING

fitting with light grey iron pistons, leakless rings, hardened and ground pins, our work has no comparison with the ordinary, now obsolete heavy type pistons and rough boring jobs. We grind our cylinders to one-half thousandths, mirror finish. We grind our pistons on the highest grade machines to fit, two and one-half thousandths clearance. We use the McCadden leakless piston rings. Work all re-assembled ready for installation. All work positively guaranteed.

Patterns and castings in stock for every make of motor.

McCADDEN MACHINE WORKS, Inc.
St. Cloud, Minnesota

CYLINDER REGRINDING PISTONS, RINGS and PINS

Quality work. Get our prices.

BUTLER MANUFACTURING CO.
ESTABLISHED 1897.
1121 EAST GEORGIA INDIANAPOLIS

CYLINDER GRINDING on automatic machinery by skilled mechanics at prices that will interest you. Gears, axles, valves and parts of all kinds made of high grade alloy steel. Send us your worn or broken parts and we will replace them. Oxy-Acetylene Welding. Cracked cylinders a specialty. Adapt Machinery Co., 1632 So. Wabash Ave., Chicago, Ill.

Personal

PERSONAL—Rheumatism cripples and tortures. Why suffer? Send address for immediate help. G. A. Stokes, Mohawk, Florida.

Piston Rings

CYLINDER GRINDING PISTONS

— AND —

RINGS

Largest Because Best.

✦ ✦

Send for Price List.

✦ ✦

Houpert Machine Co.
355 West 52nd Street
New York, N. Y.

For Sale

PYRMA ALUMINUM HEEL PLATES cover or prevent unsightly holes in floor board coverings, 75 cents each. These plates and PYRMA ALUMINUM MATTING for sale by all up-to-date dealers. Metallic Automobile Matting Co., Rochester, N. Y.

FOR SALE.—Gasoline tank and pump, retreading molds, upright coal burning boiler suitable for Vulcanizing plant, and cash register. Vanderpool Co., Springfield, O.

FOR SALE

Auto Tire Repair Equipment

8 H. P. boiler with stack and injector; 4 H. P. gasoline engine on skids; rubber; rubber cloth; breaker strip; rebuilding fabric; No. 2 Williams vulcanizer; complete vulcanizing equipment; buying stand, grinder, rasp, brushes, stitcher, roller; retreading coils; steel bolted bead rings. Never been used, in storage New York, ready immediate delivery. Answer, "Repair," care of this journal.

FOR SALE—Auto trucks, with large body. Make G. M. C. 1½ ton and 5 ton. In good order. Wm. Courtney, 379 W. Broadway, N. Y. City.

FOR SALE—Semola Carbon Remover. Absolutely guaranteed. One dollar per can, postpaid. Grace Co., 3205 West Washington, Los Angeles, Calif.

BEST LOCATED GARAGE IN PALMYRA, Pa., for sale. On the square. Agencies included. If interested please inquire of H. M. Hartz, Palmyra, Pa., Real Estate Broker.

FOR SALE—Auto garage, dwelling house, electric lights. Furnish light for town. Feed mill, lathe. $3,000. A. E. Rolf, Blaisdell, N. Dak.

FOR SALE—Garage, capacity for about twenty machines, also office adjoining same, must be sold to settle account. Isen, 1902 N. 8th St., Phila., Pa.

Rectifiers

RECTIFIERS to charge from A-C circuit 1 to 8 ignition lighting or starting batteries at one time, $12.00 upward. American Battery Co., 1136 Fulton St., Chicago, Ill.

Magnetos and Batteries

Hecht's Magneto Exchange

Dealers in Magnetos of all Makes.
Lighting Systems and Self Starters.

Expert Repairing of All Makes.

Express your Magneto, Starter and Generator to us. Same will be repaired and returned same day as received.

Distributors and Service Station for

Swiss, Heinze, National and Michigan Magnetos

— Also —

Esterline Generators, Norma Ball Bearings and all kinds of Parts carried in stock for all makes of Magnetos

230 WEST 49th STREET NEW YORK CITY

BOSCH MAGNETOS—Special values. D. U. 1, $15; D. U. 2, $20; D. U. 4, variable spark, $30; D. R. 4, $25; Z. R. 4, $35; D. U.-D. R. 6, $35; Z. R. 6, $40; D. 4, $15; D. 6, $20; A. Coils, $10. Guaranteed A-1 condition. D. F. Lenthe, 207 Market St., Newark, N. J.

Radiators and Lamps

WE REPAIR Lamps, Radiators, Windshields and Fenders, of every description. Largest repair plant in New York. Great accessory bargains on hand for immediate delivery.

HUDSON AUTO LAMP WORKS
1650 Broadway, New York City

Gears and Parts

STODDARD DAYTON PARTS

Pullman & Regal Parts

rear axle bevel gears and pinions

These are all new parts.

THE DAYTON AUTO PARTS CO.
351 West 52nd Street, New York City — **1623A McGee Street, Kansas City, Mo.**

SAVE 50% TO 75% ON PARTS—Parts for Pope-Hartford, Columbia, Reo, Buick, Overland, Chalmers, Mitchell, Thomas, Oldsmobile, Maxwell, Stoddard-Dayton, Stevens-Duryea, Corbin, Cadillac and all others. Eiseman, Splitdorf and Remy magnetos, $5.00 to $10.00. Bosch high tension magnetos, $15.00 to $25.00. Also the Mea, Connecticut National, U. & H. and K. & W. magnetos in stock. Springs, wheels, axles, etc., for all cars. Connecticut Auto Parts Co., Inc., 1070 Main St., Hartford, Conn.

Auto Accessories

AFFA SPECIALTIES

For FORD and Other Cars. They stop the rattles in the Steering Spindles, the Brake Rods, the Clevises, the Control Rods.

AFFA SPECIALTY COMPANY
34 SOUTHBRIDGE ST. WORCESTER, MASS.

NOTICE, REPAIRMEN!—If you repair Ford cars you need our line of cylinder reamers, motor stands, quick-raising jacks, portable hoists, straightening presses, speed tools and wrenches. Geneva Machine Works, Geneva, Indiana.

VULCANIZING Auto Tires is a growing business. Our plants are easy to learn to operate. Cat. is free. You save 30%. Instruction book on vulcanizing 75c. Equipment Co., 304 Eighth St., Cincinnati, Ohio.

Instruction

AUTOMOBILE INSTRUCTION—The West Side Y. M. C. A. Automobile School gives a practical course in shop and road practice in four or eight weeks, day or evening. Provision made for out of town men. 322 West 57th St., New York City.

Wanted

GARAGE PRESS WANTED—Must be cheap and in good order. Nantz Auto Co., Samson, Ala.

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Patent Attorneys

PATENTS SECURED—C. L. Parker, Patent attorney, McGill Building, Washington, D. C. Inventor's Handbook upon request.

PROTECTIVE PATENTS PROCURED PROMPTLY—Blue Book on Patents sent on request. Trade-Marks Registered. Robb & Robb, 288-292 Southern Building Washington, D. C.

RALPH N. FLINT, M. E.—Attorney-at-law in Patent Causes, late Assistant Examiner Internal Combustion Engine Division, U. S. Patent Office. Specialist in Internal Combustion Engine Cases. 2 Rector Street, New York. N. Y.

WANTED—AN IDEA! WHO CAN THINK of some simple thing to patent? Protect your ideas; they may bring you wealth; write for "Needed Inventions" and "How to Get Your Patent." Randolph & Co., Dept. 251, Washington, D. C.

IMPROVEMENTS WANTED—Send for free bulletins and advice. Book, "Inventions—Patenting and Promoting," free. Lancaster and Allwine, 212 Ouray Bldg., Washington, D. C.

STARTLING PATENT FACTS—Send postal for 1918 90-page book FREE. Your idea may mean a fortune if handled rightly. Learn how my service differs. Send sketch or model for actual search. George P. Kimmel. Patent Lawyer, 96-E Oriental Bldg., Washington, D. C.

PATENTS THAT PROTECT—Advice and books FREE. Highest references. Best results. Promptness assured. Send drawing or model for search. Watson E. Coleman, Patent Lawyer, 624 F Street, Washington, D. C.

Cork Insert Brake Lining.

The cork insert principle which has proved so successful in transmission linings and fan belts for Ford cars and introduced by the Advance Automobile Accessories Corporation, 56 East Randolph street, Chicago, has now been applied to brake linings for larger cars.

This product is made of a high-grade heavy fabric into which discs of cork



Cork Insert Brake Lining.

are inserted. These cork inserts have a high co-efficient friction, yet permit the brake drums to slide past without "grabbing." The illustration gives an idea as to how this product appears.

The Orem Motor Protector.

Some engineers have made the statement that 75 per cent. of the carbon found in gasoline engines was really dirt from the road and dust from the air, which in all probability found its way into the engine through the carburetor air intake. If this is true, then the Orem motor protector, made by the Orem Motor Protector Co., of Baltimore, Md., should be of great interest to the users of automobiles. This protector consists of a large sheet metal housing fitted with two flanges, one of which attaches to the carburetor air intake, the other to the hot air stove or left open to the air. Inside the housing is fitted a heavy screen which supports a fine felt filter. All of the air passing into the carburetor is filtered through the felt surface, which may be removed very easily for cleaning. The makers claim that, with the device, there is no danger of clogging, for the dirt is shaken from the felt to the dust pan beneath by the vibration of the machine.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912, OF AUTOMOBILE DEALER AND REPAIRER, published monthly at New York, N. Y., for April 1st, 1918.

STATE of New York } ss.
COUNTY of New York }

Before me, a notary public in and for the State and county aforesaid, personally appeared Frank R. Whitten, who having been duly sworn according to law, deposes and says that he is the business manager of the Automobile Dealer and Repairer, and that the following is to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 443, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are:
NAME OF—
Publishers—Motor Vehicle Publishing Co., 71-73 Murray St., New York City, N. Y.
Editor—M. T. Richardson, 71 Murray St., New York City, N. Y.
Managing Editor—M. T. Richardson, 71 Murray St., New York City, N. Y.
Business Managers—F. R. Whitten, 41 Pinehurst Ave., New York City, N. Y. M. T. Richardson, 71 Murray St., New York City, N. Y.

2. That the owners are:
Motor Vehicle Publishing Company, 71-73 Murray St., New York City, N. Y.
STOCKHOLDERS—M. T. Richardson, 71 Murray St., New York City, N. Y.
F. R. Whitten, 41 Pinehurst Ave., New York City, N. Y.
A. J. Richardson, Ridgewood, N. J.
Cornelius Doremus, 66 Broadway, New York City, N. Y.
Mrs. J. Howard Girardeau, Jr., Monticello, Fla.
Mrs. Guy Ulmer, Monticello, Fla.
Mrs. Harriet L. Johnston, New Rochelle, N. Y.

3. That the known bondholders, mortgagees and other security holders owning or holding 1 per cent. or more of total amount of bonds, mortgages, or other securities are: None.

4. That the two paragraphs next above giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company, but also in cases where the stockholder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear on the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds or other securities than as so stated by him.

MOTOR VEHICLE PUBLISHING CO.,
Publishers.
Automobile Dealer and Repairer.
F. R. WHITTEN, Business Manager.

Sworn to and subscribed before me this 21st day of March, 1918.

ROBERT R. VELIE,
Notary Public.

(SEAL)

(My commission expires March 30, 1918.)

Marvel Cylinder Reboring Machine.

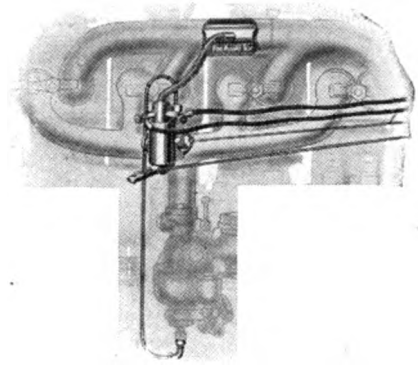
Garage men throughout the country are beginning to find a big field in cylinder reboring and motorists realize that an engine that has had the cylinders rebored operates nearly as efficiently as it did when new.

A machine designed for reboring cylinders is manufactured by the Marvel Machinery Co., 1301-7 South Third street, Minneapolis, Minn. This machine may be had to operate from engine power and countershaft or by hand and takes up a floor space of approximately 21x60 inches. The boring bar is fitted with three bearings and runs in a split nut. The boring bar is 37½ inches in length and takes care of cylinders up to 13½ inches.

Six cutter heads are provided with each machine, having a cutting capacity of from 2 3/16 to 8 inches in diameter. The face plate measures 12x18 inches and has 43 threaded holes for use in clamping the cylinders in place. Practically any size cylinder may be rebored with this machine.

Perfection 5-In-One Vitalizer.

Two facts regarding carburetion have recently been promulgated by engineers. First, the application of heat to the fuel or fuel mixture, and second, the introduction of moisture with the gas vapor,



Perfection 5-In-One Vitalizer.

have a tendency to cut down gas consumption and eliminate carbon deposits in the engine. A device manufactured by the International Motor Products Co., 2023 S. Michigan avenue, Chicago, Ill., called the Perfection 5-In-One Vitalizer, is designed along the above lines, and consists of an electrical heating unit, for heating the mixture for starting; a priming device; a hot air stove; a mixture moistening connection; and an accelerator. The manufacturers claim that with the device installed a cold engine can be started very quickly, and that there is more power, more mileage, and less carbon.

Anthony Demountable Wheels.

An accessory of general utility has been put on the market which should be of great interest to the Ford car owner and is manufactured by J. P. Gorman Co., 47 West 42nd street, New York. It is termed the Anthony Demountable Wheel and is designed to take the place of the present Ford wheel flange, utilizing the old Ford wheel. With the new device installed, a tire change is made simply by removing three nuts on the new wheel flange, taking off the wheel and putting a spare wheel in place. The complete outfit consists of four wheel changes with inside flanges, an extra Ford wheel, spare wheel carrier and a socket wrench.

Lally Commercial Bodies.

An interesting line of bodies for commercial cars is put out by the Griffin Mfg. Co., agents of the Lally Commercial Body Co., 113 State street, Boston, Mass.

Due to their growing favor in the trade the agents are now ready to license manufacturers in various parts of the country at a small fee, enabling them to make any of the 12 Lally specialties.

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SCANDINAVIA

Trademark Registered in U. S. Patent Office.

Brake Lining for FORDS is profitable to sell

It is made of the best long staple cotton interwoven into a close compact mass and then impregnated with special compounds. After a hardening and frictioning process, the lining is ready to meet Heat, Oil, and Grit. The hot, oily condition found in the Ford Planetary Transmission cannot harm it.

SCANDINAVIA has been the accepted lining for FORDS for many years:

IT WILL NOT CHATTER OR GLAZE



IT IS WEAR-PROOF

OIL AND HEAT CANNOT HURT IT

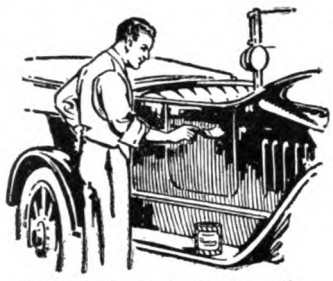
"AS EFFICIENT AS AN AIR-BRAKE"

IN ROLL LOTS OR CARTONS

SCANDINAVIA BELTING CO.

106-108 READE ST. NEW YORK, N. Y.

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Quick to dry and easy to apply. Any car owner can do it.

FOR DULL LOOKING SHODDY CARS!

WHEN the finish of a car becomes dull or shoddy looking, **it doesn't always follow that the car requires an expensive repainting job.**

Nine times out of ten all it needs is a refinishing coat of Panvar.

Panvar is a **transparent,** enameling lacque that gives to any color car a lasting lustrous finish such as it had when it left the factory.

Unlike varnish, however, Panvar is self-leveling, and as quick flowing as water. This explains why it is so easy to apply and why it never shows brush marks or streaks. This one feature alone has revolutionized a lot of old time ideas about refinishing, and overcomes the big objection car owners have to refinishing their cars themselves.

Unlike varnish, too, Panvar dries hard within eight hours; just apply at night and the car is ready for use in the morning.

Garagemen can make big profits by refinishing customers' cars over night. Results are sure and the work is easy.



Retail Prices

Quart . . .	*$1.50*
Gallon	*5.00*

Packed 12 quarts to the case for dealer trade.

Send 10c for Small Sample

THE PANVAR COMPANY
608 Bulletin Bldg., Philadelphia, Pa.
H. A. MEYERCORD, Sales Manager

SPECIAL OFFER TO DEALERS



Live dealers stock Panvar and profit by the Panvar Sales Plan.

If your jobber cannot supply you PANVAR we will ship a case of 12 quarts, all charges paid, for $12.00 to any point in the U. S. (12 samples and advertising enclosed in each case).

Name .....

Business.....

Address .....

Name of Jobber .....

This Offer to Prepay Delivery Charges for 60 Days Only

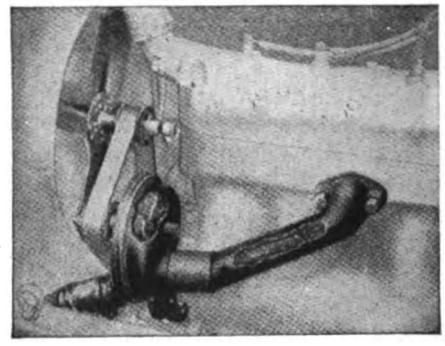


Garagemen make quick and easy profits refinishing customers' cars—about an hour's work.

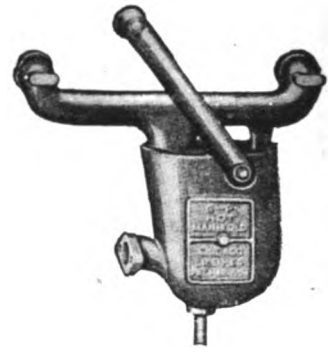
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FORD DEALERS

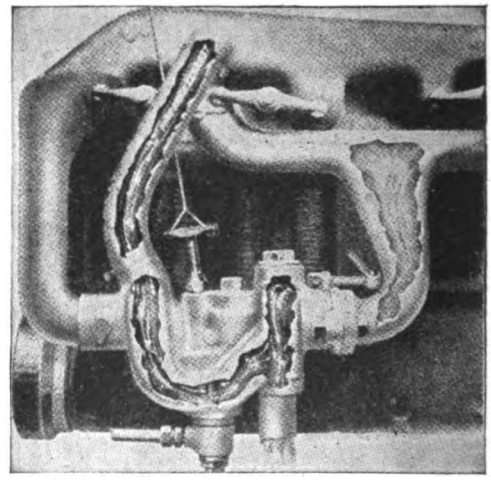
—FOR— YOUR ATTENTION AND ACTION



THIS Firestone Ford Circulator is the first centrifugal water circulator built for Ford cars, tractors or trucks. It's a perfect cooler and a cool motor means a big oil saving. This circulator pays for itself in a short time on this saving alone. Spin your engine for hours. Then put your hand on the radiator. That's the proof. Here then is a ready seller. Demonstrate it to Ford owners. They will see its value and buy it. Price, ready to install—$9 F. O. B. Chicago—your commission liberal.



HERE is the Firestone Manifold—a complete unit, to be attached to any car. Fifteen per cent more power, 25% less gasoline guaranteed. Easily installed. This manifold, by its peculiar construction has heat around the inlet manifold and so it is that fuel is delivered to the cylinder in a highly super-heated condition. Every unit of power is thereby utilized for fuel of even inferior grades. Here's a big seller. Every Ford owner who wants more speed, power and economy is a live prospect for you. Price, ready to install—$7.50 F. O. B. Chicago—Good profit in every sale.



INTRODUCING the Gelson-Firestone Carburetor, a master-worker in matters of simplified principle and design. Will burn kerosene (coal oil) distillate or gasoline without any readjustment. We assert, and you can prove that this carburetor actually burns kerosene better than other types burn gasoline—You can sell Ford Owners on an assurance of 31 miles per gallon. Prices: For gasoline $18.00—For kerosene, with extra tank and water circulator, $30.00. Splendid discounts.

WRITE TO US AND GET THE DETAILED FACTS, SELLING POSSIBILITIES AND DISCOUNTS.

FIRESTONE SALES CO.

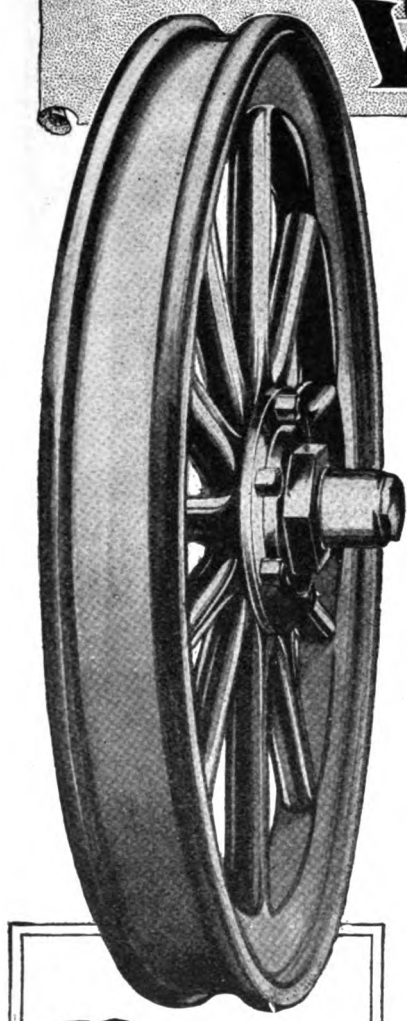
1806 Michigan Avenue - - CHICAGO

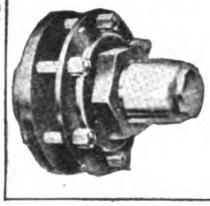
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For FORD CARS

MINUTE WHEEL

DEMOUNTABLE H-S





Equipment Extra Wheel and Flange, 4 Special Hubs and Wrench.

It's the fastest selling, most profitable Ford accessory on the market because the need for it is greatest.

A Tire Changed in 60 Seconds

After two years on the market the success of the Minute Demountable Wheel is now firmly established. It's an all year 'round seller—needed as much in the Winter as Summer. Its wonderful convenience is what sells it. Those who install it delight to demonstrate it to their friends.

Backed by strong national advertising in Saturday Evening Post, Literary Digest, Collier's, Metropolitan, Munsey's, Country Gentleman and other big mediums.

Write us for literature, prices and discounts, to Dept. K.

Retail Price, complete.....$30.00
Denver and the West.....$35.00

H-S REPAIR PARTS H-S

The extra quality of **H-S** repair parts for the Ford and Overland cars is more and more being impressed on owners' minds. They know repairs made with **H-S** parts stay repaired. You will do well to build your business in repairs on quality of parts. You will find our prices average no higher than the parts bearing no trademark.

Write for repair price list and catalogue, Dept. K.

Licensed under patents of Wire Wheel Corporation of America

HIGHEST QUALITY H-S TRADE MARK PROMPT SERVICE

This trademark guarantees to you quality in material and workmanship — perfect fitting parts.

HILL-SMITH METAL GOODS COMPANY

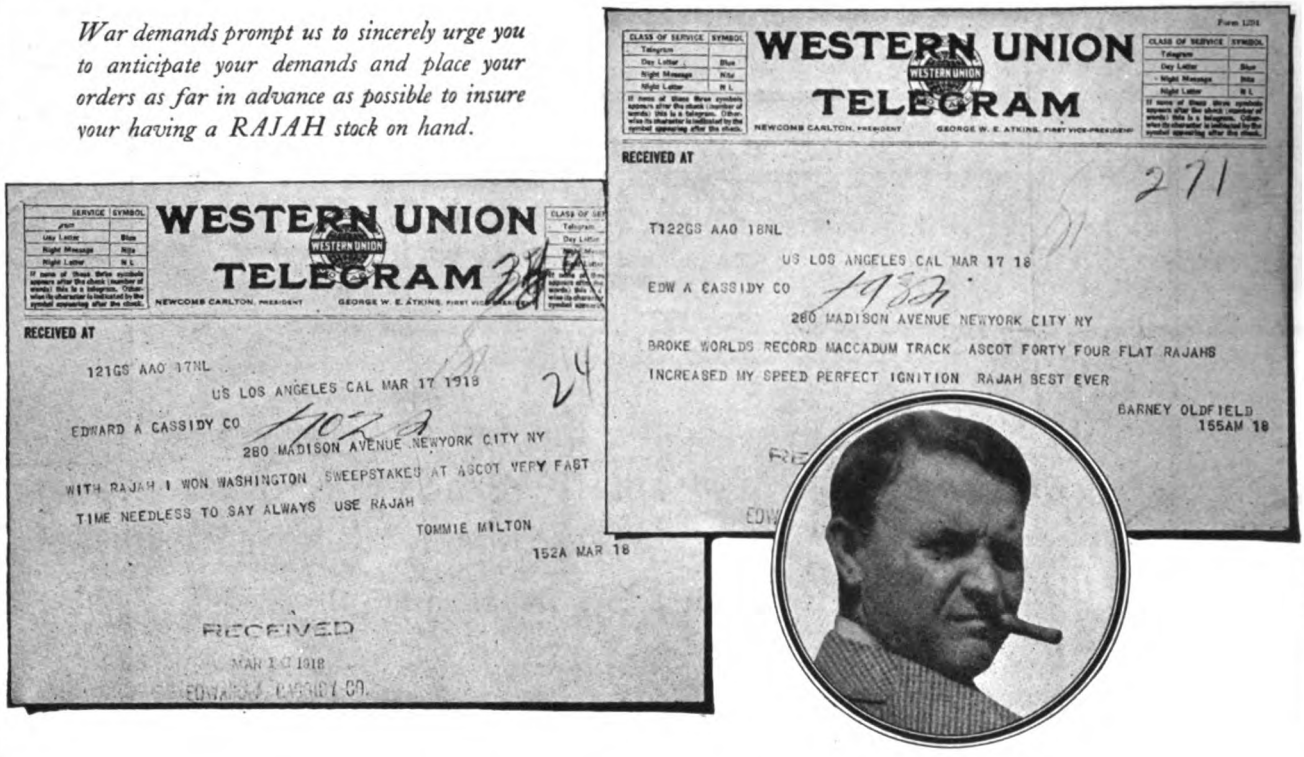
MANUFACTURERS OF MOTOR PARTS AND ACCESSORIES

REPAIR PARTS FOR THE FORD AND OVERLAND CARS

BOSTON MASS.

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War demands prompt us to sincerely urge you to anticipate your demands and place your orders as far in advance as possible to insure your having a RAJAH stock on hand.



Rajah Spark Plugs
again prove their supremacy

The world's record on a macadam track has just been won by BARNEY OLDFIELD *with* RAJAH PLUGS

On the same track, on the same day Tommie Milton won the Washington Sweepstakes with Rajah Plugs.

The record of Rajah Plugs in all big racing events in the past is being repeated today. It is the performance of Rajahs, under the severest of tests, that proves their superiority for the every-day needs of car owners.



Sell the Plug that has demonstrated its dependability. That's the way to build up trade and hold it. If you have no Rajahs in stock, your jobber can supply you.

Manufactured by
Rajah Auto-Supply Company
Bloomfield, N. J.
***Sales Department*, Edward A. Cassidy Co.**
280 Madison Avenue, New York

RAJAH
SPARK PLUGS

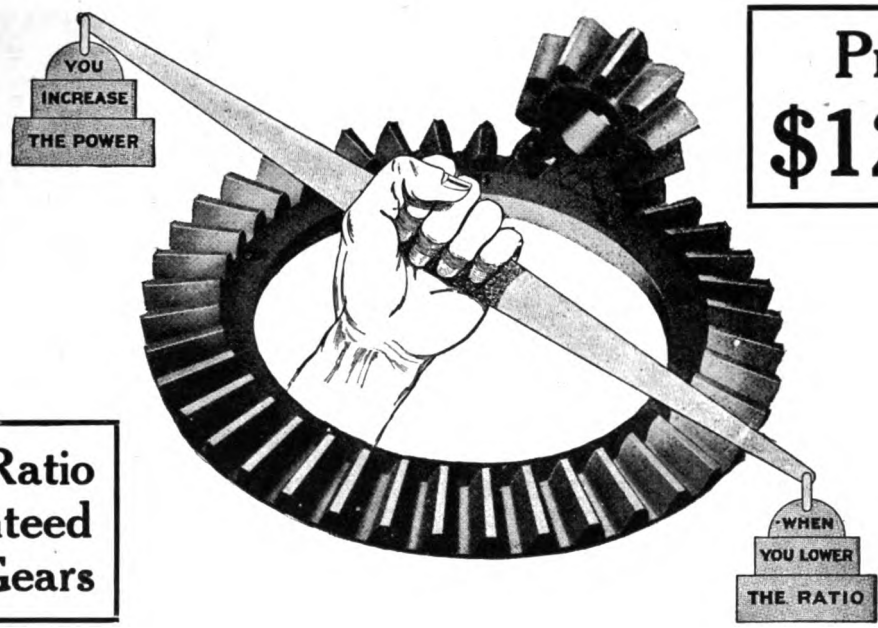
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KROM-NIK Anderson Special Ratio Gears for Ford Cars

4.2 to 1

greatest possible gear reduction



Price $12.00

4.2 to 1 Ratio Guaranteed Rolled Gears

20 Per Cent More Power for Ford Cars

You can add 20 per cent more power to Ford cars by installing Krom-Nik-Anderson Special 4.2 to 1 ratio gears. The cost is low—$12.00 retail.

The actual cost is more than saved in the first year, for the cost of maintenance and upkeep is greatly lowered by this device. The 4.2 to 1 ratio offered in the Krom-Nik gears is the lowest gear reduction possible in a Ford axle.

In hilly country, on hard going, the Krom-Nik gives greater power and efficiency. Its special type of tooth, an exclusive Krom-Nik feature, offers a better surface than the standard tooth, accomplishing work impossible with the standard gear.

Special Racing Gear 3 to 1 Ratio $12.00

Manufacturers, wholesale and commercial houses that use Ford cars for deliveries report that Krom-Nik gears outwear from two to five sets of the ordinary gears. They solve the rear axle problem. Price $12.00. Easy to install.

There are profits to be earned in your territory from the sale of Krom-Nik-Anderson 4.2 to 1 ratio special gears.

Every Ford owner is a prospect. The price is low—$12.00 retail, with liberal discount to dealers.

Try out this gear. Send for a Krom-Nik. Try it. Guaranteed. Money back if not entirely satisfied. If your jobber cannot supply you, order direct. Use the coupon.

KROM-NIK GEAR COMPANY, 808 Grant Park Bldg., Chicago, Ill.

M & S Locking Differential

Pulls Both Wheels

Cars and trucks equipped with M & S locking differential keep going in all kinds of weather. Used on Government trucks, Nash trucks, Republic and many others. If one wheel loses traction, all power is transferred to the wheel that does hold. No slipping, no skidding, no spinning on rear wheels. . . . . **Price $20.00**

KROM-NIK GEAR COMPANY, CHICAGO, ILLINOIS

Send me { Parcel Post.....Krom-Nik-Anderson 4.2 to 1 Ratio Gears... Price $12.00
Express .....M & S Locking Differential..... Price $20.00

less dealer discount. Enclosed find check or ship C. O. D.

My jobber is.....

Name.....

Address .....

City.....

It is understood that you guarantee workmanship and material for one year.

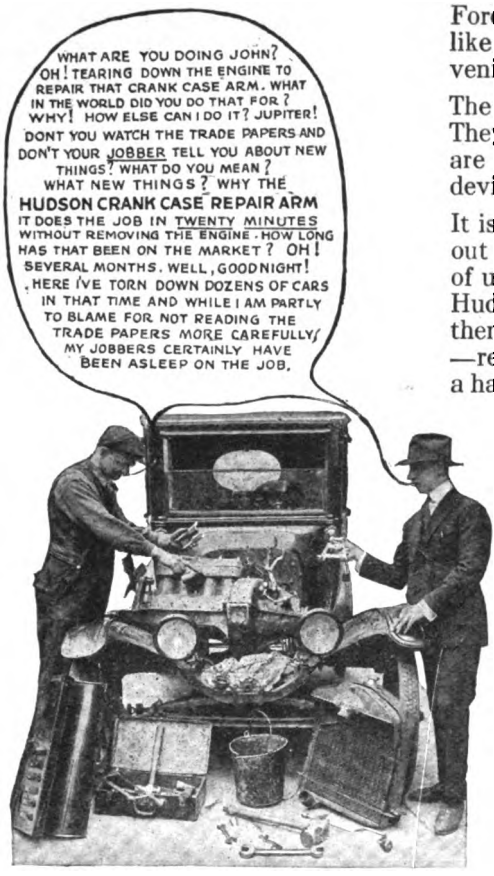
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HUDSON

CRANK CASE REPAIR ARM

$1.50 F. O. B. Philadelphia



HUDSON Crank Case Repair Arms are as necessary to garagemen, repairmen and Ford owners as watches are to railroad men. To repair broken Ford crank cases the slow old way is like telling time by the sun—It's inconvenient and more complicated.

The photographs tell the Hudson story. They tell how time, money and labor are saved by the use of this repair device.

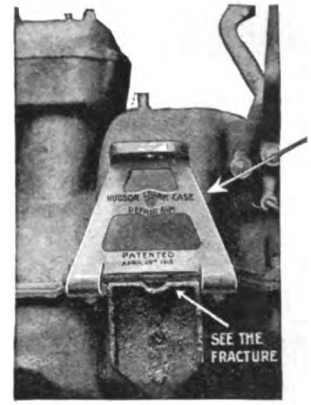
It is not necessary to take the engine out of the chassis—it's just a matter of unloosening three bolts, slipping the Hudson Arm into place and tightening them up again to make a perfect repair—requiring less than a half hour to do a half day's job.

Every repairman should have Hudson Repair Arms for making crank case repairs and a stock to sell Ford owners. Get them from your jobber—if his name is not listed, write us direct.

Jobbers: Here's a rapid and a profitable seller. It is one that you can sell to practically all your customers. Write us at once for discounts.

It is patented—
beware of infringers

$1.50 F. O. B. Philadelphia





A Wrench and 15 Minutes Does the Work

JOBBERS IN UNITED STATES and CANADA

PENNSYLVANIA
Philadelphia
Hudford Phila., Sales Co., Inc.
Auto Specialties Co., 156 N. Broad St.
Miller & Ecret Company
J. H. McCullough & Son
Berrodin Rubber Co.
Geo. W. Nock Co., 1304 Race St.
Cahall Motor Supply Co.
Roberts Electric Supply Co.
Gaul, Derr & Shearer Co.
Standard Supply & Equipment Co.
Manufacturers Supplies Co.
Grim's Auto Supply Co.
Allentown
Great Eastern Rubber Co.
Motor Accessories Company
Hersh Hardware Company
Lancaster
General Auto Supply Co.
Pittsburgh
Dyke Motor Supply Co.
Joseph Woodwell Co.
Auto Accessories Co.
Johnstown
Swank Hardware Co.
SOUTH CAROLINA
Florence
D. W. Alderman Co.
Charleston
Cameron & Barkley Co.
OHIO
Cleveland
Cray Bros.
M & M Company
Pennsylvania Rubber Co.
RHODE ISLAND
Providence
Post & Lester Company
Waite Auto Supply Co.
MARYLAND
Baltimore
Baltimore Hub Wheel & Mfg. Co.
Piet Robertson Rainey Co.
MASSACHUSETTS
Boston
Post & Lester Company
John V. Wilson Co.
Motor Car Equipment Co.
Wetmore Savage Company
NEW YORK
New York City
Hudford Sales Corporation
Strong & Trowbridge Co.
W. E. Pruden Hardware Co.
Westchester Accessories Co.
Lowe Motor Supplies Co:
Motor Car Equipment Co.
A. J. Picard & Co.
Whitmore-Sim Co.
Westchester Accessory Co.
Richards Auto Supply Co.
Brooklyn
Martin Evans Company
IOWA
Council Bluffs
Rothert Motor & Supply Co.
Des Moines
Herring Motor Company
DELAWARE
Wilmington
Automobile Supply Co.
Delaware Hardware Co.
Wilson Hardware Co.
CALIFORNIA
San Francisco
W. E. & W. H. Jackson
MISSOURI
Saint Joseph
Ayers Farmer Auto Supply Co.
St. Louis
Siego Iron Store
Neustadt Auto & Supply Co.
Kansas City
Bonniwell Calvin Iron Co.
ILLINOIS
Chicago
Hudford Co. of Chicago, Inc.
MICHIGAN
Detroit
E. A. Bowman Company
Automobile Equipment Co.
Automobile Supply Co.
TEXAS
Fort Worth
Texas Auto Supply Co.
CONNECTICUT
Hartford
Post & Lester Company
NEW JERSEY
Newark
Motor Car Equipment Co.
Thompson Reilly Co.
Elin Auto Supply Co.
Economy Auto Supply Co.
H-H-H Motor Supply Co.
CANADA
Montreal, Quebec
Canadian Fairbanks-Morse Co., Ltd.
Windsor, Ontario
Universal Car Agency
Hamilton, Ontario
Wood, Alexander & James
EXPORTERS
Pedro y Seltzer, Inc., New York City
Kemsley Millbourn Company, New York City—Australia
Dodge & Seymour Company, New York City—Australia and S Africa
Pacific Commercial Company, New York City—Philippine Islands

HUDSON MOTOR SPECIALTIES COMPANY

1606 Real Estate Trust Building : : : : PHILADELPHIA, PA.

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IS IT WORTH A 3 CENT POSTAGE STAMP?

For any automobile dealer, repair man, garage owner or car owner to receive this useful and instructive magazine, the AUTOMOBILE DEALER AND REPAIRER.

THREE MONTHS FREE

This is our introductory offer to non-subscribers only

In nine cases out of ten, when an intelligent man owning an automobile, or connected with the automobile trade, receives a few copies of this publication, he is so much pleased and impressed that he is willing and glad to become a regular paid subscriber at one dollar per year, and of course that is our chief object in making this offer.

Thousands of readers will testify to the fact that a subscription to the AUTOMOBILE DEALER AND REPAIRER is a good investment and many have told us that they have derived benefit from reading our publication, which was worth to them many times the nominal subscription price.

Here are a few of many unsolicited testimonials which are constantly coming in to us from all parts of the country.

TESTIMONIALS

From LEADER TIRE SHOP, Ohio.
"The value of the Automobile Dealer and Repairer to all connected with the operating, repairing and general upkeep of automobiles, general repairs, etc., can be summed up in one word, "'Invaluable.'"

From T. B. WELLER, Washington.
"I consider your magazine (Automobile Dealer and Repairer) the most interesting and instructive of several motor books I read, especially the "Trouble Department," which has solved a number of very perplexing problems for me."

From R. G. MATTHEWS, Georgia.
"I have seen a number of publications in this line, and want to congratulate you on getting out the very best of them all. Indeed, no others compare with the Automobile Dealer and Repairer. One can get from it more information at less cost than from any other source I know."

From C. S. ADAM, Washington.
"I wish to compliment you on the fine journal you are maintaining. Each number of the Automobile Dealer and Repairer is worth the price of a year's subscription to any man who operates a car. It is surprising to find so many who are constantly in trouble with their cars but will not let go of a dollar for a journal that will save them many times its cost."

From GEORGE O. SMITH, Illinois.
"I take several automobile papers, but find yours is always in the lead. I would subscribe to the Automobile Dealer and Repairer, if you raised the rate to $3.00 per year, as it would be worth the money. I don't see how I could get along without it."
Another enthusiastic subscriber says he would not be without the Automobile Dealer and Repairer if it cost $15.00 per year.

From FRANK BLUM, Ohio.
"Your paper is better on operating and repairing a car than all the other papers combined that I am taking. Your "Trouble Department" alone is worth more than the subscription price."

FROM F. A. BURGER, California.
"It (Automobile Dealer and Repairer) certainly contains more valuable information for the general repair man than any other motor car journal I have ever read, and I surely subscribe to a "flock" of them."

From E. E. CLARK, North Carolina.
"I have had your magazine for a year and will not do without it as long as I can get it. I always look at the Trouble Department the first thing. If a man has an automobile he can afford to pay ten dollars a year for the information he will get out of your magazine, if he cannot get it for less."

If you are not a subscriber to this journal, you may enjoy the advantages of this introductory offer, by filling out the coupon in right hand lower corner of this page, with your name and full address, giving your street and number or post office box number.

Just fill out the coupon before you forget it—slip it into an envelope and address the envelope to the Motor Vehicle Publishing Company, 71-73 Murray Street, New York City, and mail it in.

The result will be that you will receive a magazine replete with valuable information in regard to the care and repair of your car, or if you are in the trade you will receive a great many interesting and valuable hints on repair work and methods of conducting your business.

If you are already a subscriber to our magazine, please see that the coupon on this page is used for one of your friends. Either request a friend of yours to fill out the coupon and send it in to us or fill it out yourself, with the understanding that you are anxious to have your friend receive our magazine, because you feel that he will surely like it and appreciate its usefulness and merit.

You couldn't make a better present to any friend who owns a car or who is interested in the automobile business than this three months trial of the AUTOMOBILE DEALER AND REPAIRER, and when you come to think it over, we feel sure you will agree with us.

We cannot guarantee that the coupon will ever be repeated in future issues of our magazine, so cut it out and have it filled out and send in to us NOW, before you forget it.

Motor Vehicle Publishing Company
71-73 MURRAY STREET NEW YORK CITY

CUT OUT THIS COUPON AND MAIL IT!

SPECIAL COUPON—3 Months Free Trial Offer

Please send me copies of the Automobile Dealer and Repairer for three consecutive months and it is understood that these will be mailed to my address absolutely free and without any obligation whatever to subscribe for the magazine or to buy future issues.

Name.....

City or Town.....

Street and No. or Post Office Box.....

County.....

State.....

This coupon not good for subscribers. Will not be accepted for the extension of subscriptions now in force.

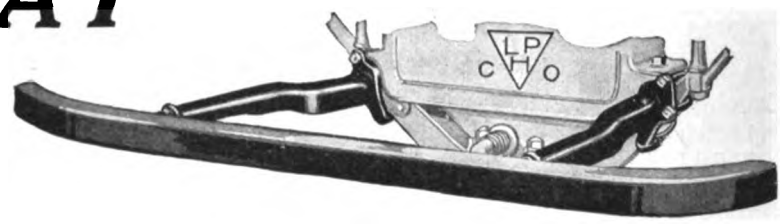
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PROTECT YOUR FORD

FRONT AND REAR

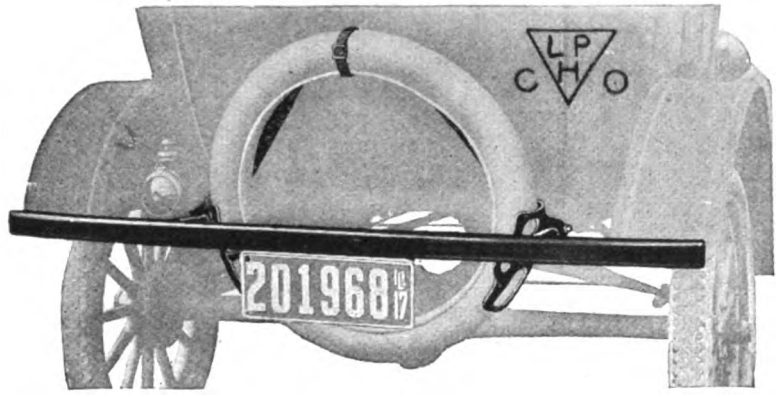
HALLADAY

Front Bumper



The strongest and most attractive bumper ever put on a Ford car. Quickly attached and positively non-rattling.

Rear Bumper and Tire Carrier Combined



Bumper Furnished Without Carrier If Desired

Here is a brand new rear bumper for Ford cars, embracing Halladay quality and attractive appearance in combination with a most efficient rear tire carrier, strong enough to carry one or two tires or a demountable wheel if desired.

The tire is supported at the top by an upwardly extending member of the carrier and has no connection with the body nor is any strain put thereon.

The new rear bumper is furnished with or without the tire carrier, as desired.

Live dealers sell these and other

HALLADAY HELPS for FORD CARS

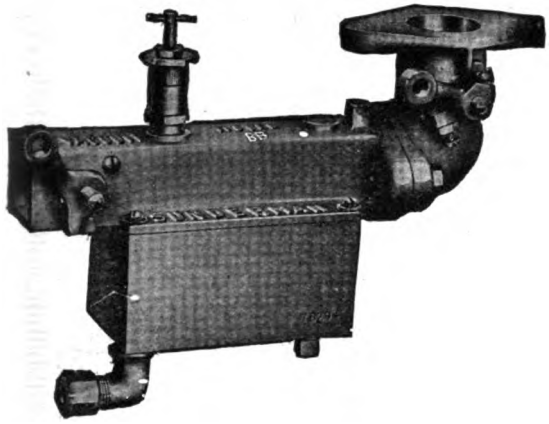
See your dealer for details and prices

L. P. HALLADAY COMPANY

STREATOR, ILLINOIS

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SUNDERMAN
Vacuum Carburetor



MODEL BB

$8 WITHOUT CONNECTION
$10 with regular connection
$12 with special connection

Model F—Special for Ford, Metz and Saxon Four - - $6

F. O. B. Newburgh

POWER, PEP AND PUNCH BEYOND YOUR FONDEST DREAMS

NEARLY every Sunderman Carburetor that ever left our factory was put on a motor to replace an instrument that was failing to give satisfaction.

That's an unbelievably hard job for any carburetor—some of our competitors believe it is impossible.

Yet our business has been built on replacement trade alone! Cars of every make, of every model, cars that were discouraging their owners because of motor inefficiency—have been equipped with Sunderman Carburetors within the last two years, and the result is almost universal satisfaction.

We have thousands of letters that have come to us unsolicited from enthusiastic, satisfied buyers of Sunderman Carburetors.

They tell a story, collectively, that we wouldn't dare print without this documentary support.

We have frequently printed letters of this character in the advertising pages of this magazine. We are preparing another such advertisement.

But the Story Is Always the Same.

The message they carry is always the same—*always* the same. Gasoline economy from 30 to 50%—some of them show an even greater saving.

Mileage increased proportionately; speed beyond the motor's original capacity. Power never before experienced. Acceleration as swift, flexibility as great as claimed by the makers of the wonderful eight and twelve-cylinder motors. Hill-climbing ability, economical idling, fast get-away, speedy pick-up, less gearshifting—our customers say over their own signatures that the Sunderman Carburetor gives them all—gives Power, Pep and Punch beyond their fondest dreams.

Prove It Yourself

Submit these statements to any test you can conceive. Buy one of our carburetors today. Mail us your order and let this great instrument begin at once to make good for you. Tell us the make and model of your car—and let us give you special factory service in calibrating a carburetor for your particular requirements. But do it now—before our annual spring freshet of orders starts.

DEALERS: We have been advertising with the utmost regularity and consistency now for over two years in a wide list of motoring papers, until the Sunderman Carburetor is one of the best-known carburetors in the industry.

We have done this advertising to support your efforts in our behalf.

For what you have done we thank you. For what you will do this year, let the profits that come from this advertising drive be your reward.

But get busy. We don't want to sell a single carburetor in your town except through you. We want you to have the profits in return for your selling effort.

There are a great many towns even yet where we can place dealerships.

Write and ask us for our proposition

SUNDERMAN CORPORATION

13 Chambers St. **Newburgh, New York**

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The Ring that makes the Motor Sing —Why?



CAR owners who have had Hi-Comp Piston Rings installed are amazed at the results of these magic rings. Engine troubles due to carbon have ended—knocking, skipping, faulty ignition loss of power, high gasoline and oil consumption.

HI-COMP PISTON RING

are not new on the market, but are made by an old established piston ring company from 2 perfectly balanced eccentric rings into one absolutely power-proof concentric ring that forms a gas-tight seal against the cylinder walls *all ways*, always.

Hi-Comps are made from secret process gray iron, ground and polished under oil—not buffeted—to preserve the *true* temper and insure its great durability. The fact that they don't wear cylinders out of round proves their equal radial expansion. Make reboring of average cylinders unnecessary—an exclusive Hi-Comp feature.

Install them in your customers' cars. They will make their engines *sing* a tune that tells of NEW POWER, NEW LIFE, INCREASED EFFICIENCY and bigger savings in gasoline and oil over every other gas-tight ring. Leaky piston rings waste as high as 1 drop of gasoline every 4—Hi-Comps deliver every atom of power from every drop of gasoline. Write *now* for booklet, specification chart and details of liberal 90 day trial guarantee.

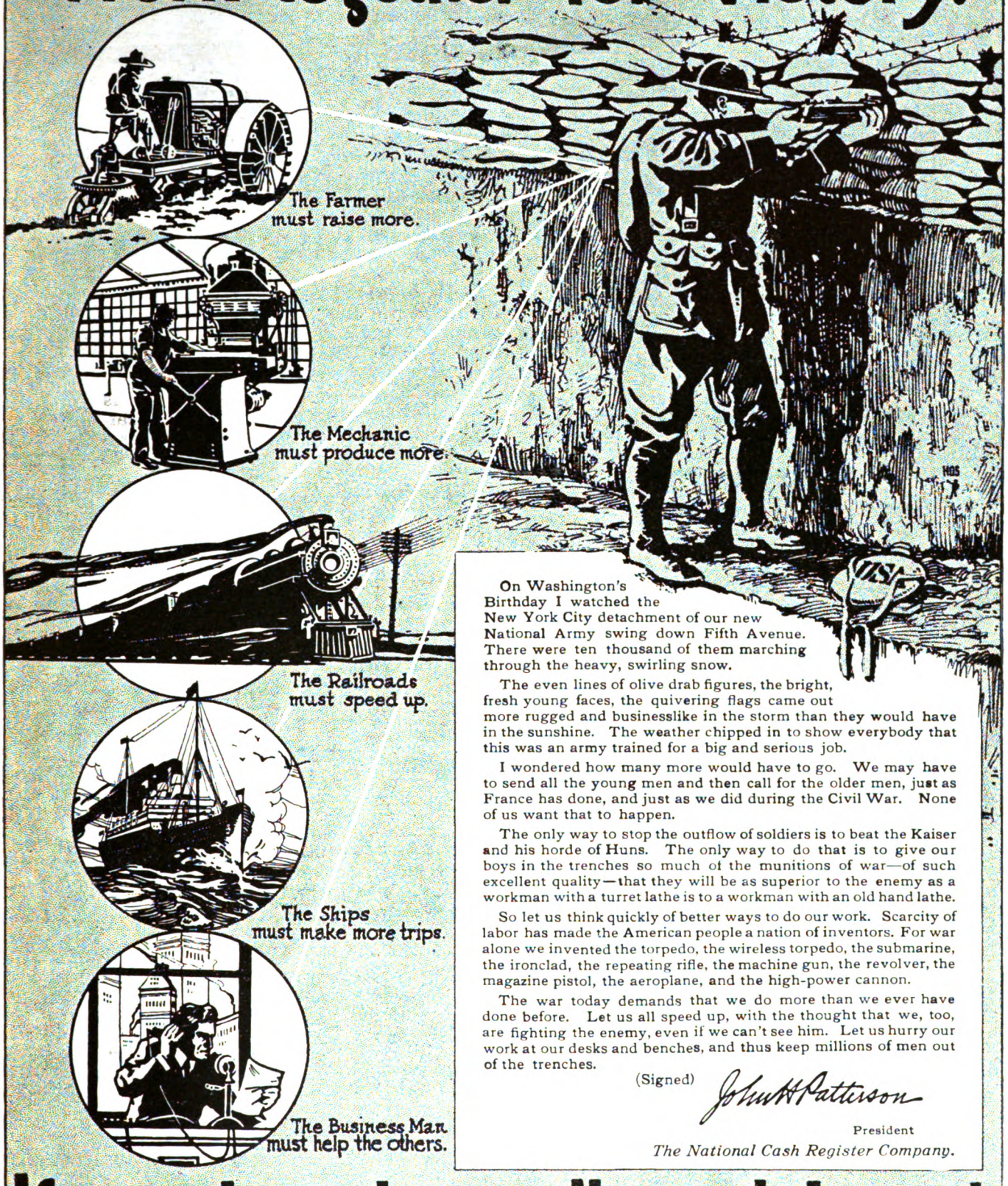
Continental Piston Ring Company

MEMPHIS, TENN.

G.R.

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Work together for victory.



On Washington's Birthday I watched the New York City detachment of our new National Army swing down Fifth Avenue. There were ten thousand of them marching through the heavy, swirling snow.

The even lines of olive drab figures, the bright, fresh young faces, the quivering flags came out more rugged and businesslike in the storm than they would have in the sunshine. The weather chipped in to show everybody that this was an army trained for a big and serious job.

I wondered how many more would have to go. We may have to send all the young men and then call for the older men, just as France has done, and just as we did during the Civil War. None of us want that to happen.

The only way to stop the outflow of soldiers is to beat the Kaiser and his horde of Huns. The only way to do that is to give our boys in the trenches so much of the munitions of war—of such excellent quality—that they will be as superior to the enemy as a workman with a turret lathe is to a workman with an old hand lathe.

So let us think quickly of better ways to do our work. Scarcity of labor has made the American people a nation of inventors. For war alone we invented the torpedo, the wireless torpedo, the submarine, the ironclad, the repeating rifle, the machine gun, the revolver, the magazine pistol, the aeroplane, and the high-power cannon.

The war today demands that we do more than we ever have done before. Let us all speed up, with the thought that we, too, are fighting the enemy, even if we can't see him. Let us hurry our work at our desks and benches, and thus keep millions of men out of the trenches.

(Signed) John H. Patterson

President

The National Cash Register Company.

If one slows down all are delayed.

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It adds to your profits

The H L B Junior Display Rack has proved itself a money maker for scores of dealers now handling HLB belting. Put this

New Junior *Display Rack*

to work for you. It will put greater profits in the till.

The Rack is an attractive display for any store. It is substantially made of good materials, and is surmounted by a lithographed sign in colors. Size: 2 ft. wide, 1 ft. deep, 2 ft. 2 in. high.

At a glance you can see how much stock you have. With it, your supply of belting is in one compact form, easily handled, and well displayed.

Get this Rack—FREE

The H L B Junior Display Rack will be furnished free to dealers ordering the general assortment listed below. Write today for complete information, prices, etc.

The Assortment

WETPRUFE
Flat Fan Belting
50 ft. roll, 1-inch
50 ft. roll, ¾-inch

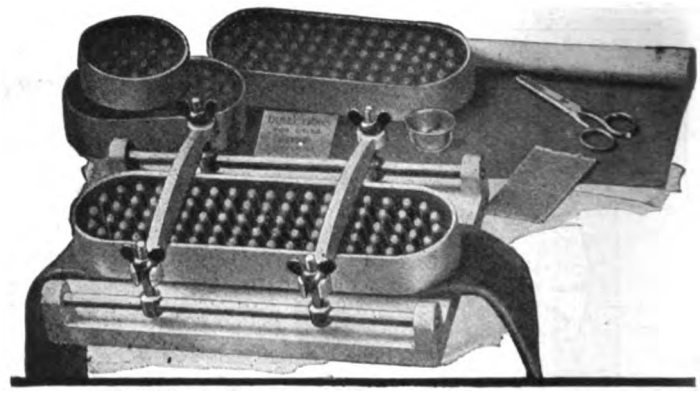
LEATHEROUND
(Round) Fan Belting
25 ft. spool $\frac{5}{16}$-inch
25 ft. spool $\frac{3}{8}$-inch

VEE SOL
(Solid "V" Fan Belting)
25 ft. spool $\frac{5}{8}$-inch

VEE FLEX
(Laminated "V" Fan Belting)
50 ft. spool $\frac{5}{8}$-inch
25 ft. spool ¾-inch

HIDE, LEATHER & BELTING CO.

225 So. Meridian St., Indianapolis, U. S. A.



Do Tube Repairing

This Model S-1 Adamson is designed especially for repairing inner tubes, and will vulcanize a patch up to 12 inches in length. Uses common gasoline—no steam or electricity, no waiting—always ready for instant use.

It works automatically—needs no watching or personal attention. Anyone can operate it in his odd moments, and make quick, sure and lasting repairs in a few minutes time—at the lowest possible cost.

ONLY $12.00 COMPLETE

With half pound of repair gum

Put one in your place of business. It takes up practically no room; requires no extra help; and will pay for itself many times over.

ADAMSON

MODEL S-1

VULCANIZER



TYPE "H"

OUR H-1 OUTFIT

consists of three Model S-1 supported by floor stand and provided with hood for flue connection.

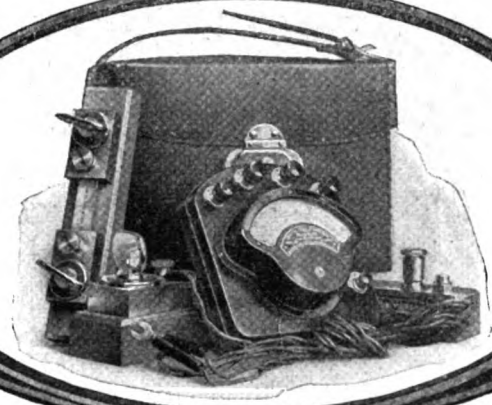
Price Complete $30.00

Start a Tire and Tube Repair Department with an "Adamson."

Immediate shipments, order today.

ADAMSON MFG. CO.
East Palestine, Ohio.

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Bespeaking Patience

It has become necessary to advise prospective purchasers of the Weston Model 280 Garage Testing Instrument, that deliveries can no longer be made promptly. Under present war conditions, there are unusual requirements which must receive our consideration in advance of commercial orders.

For this reason, we can accept your order only on the basis of delivery when possible. We suggest that you place it as early as you can.

Appreciating fully the needs of our customers and that the radical superiority of the Weston Model 280 Garage Testing Instrument is now well known to the Garage and Service Station men, we promise to execute orders in the order of their receipt and as quickly as conditions will permit.

We are confident that this frank explanation of the situation will be accepted by prospective purchasers in the co-operative spirit in which it is submitted.

WESTON ELECTRICAL INSTRUMENT CO.

2 Weston Avenue Newark, N. J.

23 Branch Offices in the Larger Cities

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now 2,000,000 in use



INLAND
1 PIECE PISTON RING

There are REASONS why Inlands sell so fast. GET THEM!
Inland Machine Works, 802 Mound St., St. Louis, Mo.

WONDER WORKER
LIQUO-SEAL
A WONDERFUL CEMENT FOR LEAKY RADIATORS



LIQUO-SEAL not only finds leaks in radiators and fixes them, but prevents rust and scale from forming.

A small quantity is poured into the radiator and upon contact with the air it forms into cement, *immediately stopping the leak.*

Contains nothing to injure or clog up cooling system in finest honey-comb radiators.

Will automatically stop any new leaks from forming.

FORD SIZE, - - EACH, $0.75
LARGE CAR SIZE, EACH, 1.50

THE HALL-THOMPSON CO.
HARTFORD, CONN.

Our 1918 Catalog and Latest Price List showing 47 Different Chemical Specialties, is now ready for distribution.

Electrotypes for catalogs furnished upon request.

PILOT "THE CAR AHEAD"
Six Forty-five $1395
Five-Passenger "Double Cowl" Touring Car
Four-Passenger "Get-Chummy" Roadster
PILOT MOTOR CAR COMPANY
281 Fort Wayne Ave., Richmond, Indiana, U.S.A.

Electric Trouble Shooter
Detects and locates, quickly and accurately, trouble in any American made starting and lighting system used as standard on any American made car.
AMERICAN BUREAU OF ENGINEERING, Inc.
1028 So. Wabash Ave. Chicago, Ill.

DEFENDER LOCK
FOR FORDS $4.00 (in Canada $5.00)
No automobile thief—regardless of how well he may know the mechanism of a Ford car—can tamper with this lock and beat it. It is the simplest, yet the strongest lock made. With it more than a million combinations are possible. *Write for literature.*
DEFENDER AUTO LOCK CO.
506-8 MARQUETTE BLDG., DETROIT, MICH.
Canadian Address: No. 3 Ouellette St., Windsor, Ont.

ALL TYPES OF BALL BEARINGS
Both New and Reground, Carried in Stock.
BEARINGS CO. OF PA.
684 N. Broad St., Philadelphia.
1864 Broadway, N. Y. 2204 Michigan Ave., Chicago

THE WEAVER Auto Ambulance
WILL PAY FOR ITSELF IN A FEW TRIPS
It enables one man to run out and tow in a crippled car in one-fifth the time it would ordinarily require two or three men to do the same work with the improvised methods usually employed.
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WEAVER MFG. CO., 2175-79 S. Ninth St., Springfield, Ill.

AUTOMOBILE ACCESSORIES
ECONOMY
EFFICIENCY AND BETTER SERVICE
"You don't have to buy from us—but you will."
Write us for full information.
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H. J. CURTIS, Genl. Mgr.
170 Broadway, New York

WAR SAVINGS STAMPS DELIVERED TO YOUR HOME
Tear Out—Fill In—Hand Letter-Carrier—or Mail to Post Office

TO THE LOCAL POSTMASTER:—Kindly have letter-carrier deliver to me on _____ (Date) for which I will pay on delivery:

_____ (State number wanted) $5. U. S. WAR-SAVINGS STAMPS at $_____ (See prices below) each

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WAR SAVINGS STAMPS ISSUED BY THE UNITED STATES GOVERNMENT

W. S. S. COST DURING 1918

April	$4.15	July	$4.18	Oct.	$4.21
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W. S. S. WORTH $5.00 JANUARY 1, 1923

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Flexlume signs have raised white letters standing out from a dark background which makes them not only strong when illuminated, but perfect day signs as well.

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THE FLEXLUME SIGN CO.
1445-1451 Niagara Street Buffalo, N. Y.
Flexlume Sign Co., Ltd., St. Catharines, Ont.
Electric Products Corporation, Los Angeles, Cal.

"IDEAL" Lawnmower Grinder

Grinds all makes of mowers perfectly in 15 minutes, without removing reel knives. Best money maker you can have in your shop. Nearly 10,000 in use.

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$4.25 For Single Tone Model $6.00 For Chime Model

Wonderful improvement in warning devices. Surest—safest—most economical ever constructed.

USED BY 21 MANUFACTURERS

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Any Gear, Wheel, Pulley, Off Quick as a Wink, When You Use the "LITTLE GIANT" GEAR and WHEEL PULLER

Terrific pulling power. No "struggle"—no slipping. "Harder the pull, the tighter the grip." Sure, speedy action. Adjustable to 13 in. Tough Drop Forge Steel construction. Price $10. Big Dealer Discount. Send NOW. Money back if not satisfied.

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Easyon Chains

"Grip Like a Mud Hook-Ride Like a Bare Tire"

"Classic" Curtain Lights

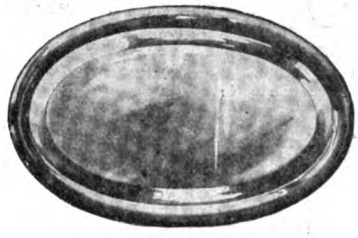
"The Lightest Lights"



No. 3-C

SIZE: 6 inch round—inside measurement.

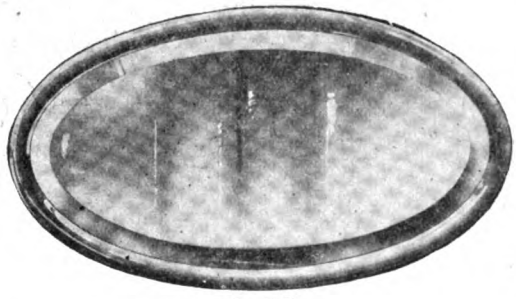
Brass nickel plated frame outside; black enameled inside companion ring; beveled plate glass.



No. 2-C

SIZE: 5¾x9½ inch oval—inside measurements.

Brass nickel plated frame outside; black enameled inside companion ring; beveled plate glass.



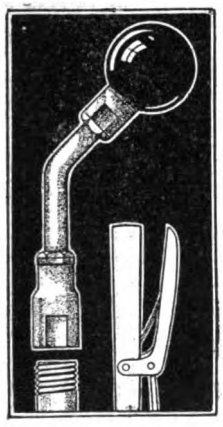
No. 1-C

SIZE: 7⅞x12½ inch oval —inside measurements.

Brass nickel plated frame outside; black enameled inside companion ring; beveled plate glass.

Net Prices on Request

Jos. N. Smith & Co.
Detroit, Mich.



SHORT ARMS OR LONG

MELLIN'S ADJUSTABLE EXTENSION brings the Gear-shift Lever to just the *convenient* position for each driver.

A needed accessory that sells readily at $1.25, $1.50 and $2.00, with ample dealer discount.

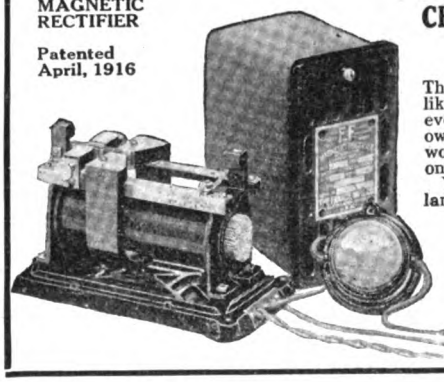
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OR WRITE

M & H NOVELTY CO.
857 EAST 24th ST. Los Angeles, Cal.

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MAGNETIC RECTIFIER

Patented April, 1916



Full Wave A. C. Rectifier

CHARGE YOUR OWN BATTERIES

For Public or Private Use

This little machine is selling like hot cakes and makes every purchaser smile at his own business sagacity, and wonder why he hadn't bought one before.

You simply attach it to the lamp socket and at a few cents cost for current, your battery is full of "pep." Buy Now.

$24 Complete, and up F. O. B. Cleveland

The France Mfg. Co.
Cleveland, Ohio

Ask Your Dealer or Write for Bulletin No. 10



Guarantee Visible Pumps

Fast service, full measure and perfectly filtered gasoline, assure dealers the constant patronage of satisfied customers.

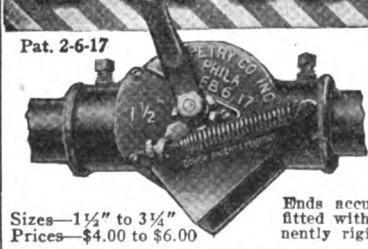
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DISTRIBUTOR

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FARMERS BANK BUILDING
PITTSBURGH, PA.

PETRY CUT OUT

Pat. 2-6-17



Gases expelled to the rear through patented flared opening, prevents all back pressure. Lever has seven adjustments, which make easy installation. Spring is away from the body of Cut-out, does not absorb heat, has a simple tension adjustment and easy action, no strain on the exhaust pipe.

Ends accurately machined for pipe size and fitted with set screw, which insures a permanently rigid installation.

Sizes—1½" to 3¼"
Prices—$4.00 to $6.00

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QUALITY SPRINGS
FOR REPLACEMENT

are not strong in one place and ***weak*** in another. See the center construction. The millions of Higgins Springs ***in*** service — the length of time they've ***been*** in service prove it the most perfect center spring formation ever devised. Leaves nibbed together. No center bolt. No center hole. No center hump. No place for even a crack to get a start—or a smashing jolt to wreck the spring.

Higgins Quality Springs for Replacement are built of best grade of motor car spring steel of special analysis—properly heat treated. Wonderfully resilient. ***Ease*** heaviest loads over roughest roads with a jolt-free ***safe*** sway. Lubricated before assembled—no annoying squeaks. Handsomely finished in black. Critically tested before shipping. Guaranteed alike at all points.

DEALERS — Higgins Quality is a customer ***"keeper"***—a permanent trade builder—a profitable business producer. Better send for discounts and catalog listing 500 different style springs while it's on your mind. It'll pay you ***Big.***

HIGGINS SPRING & AXLE CO.
RACINE, Dept. 515, WISCONSIN

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Your Jobber Handles These Shop Tools

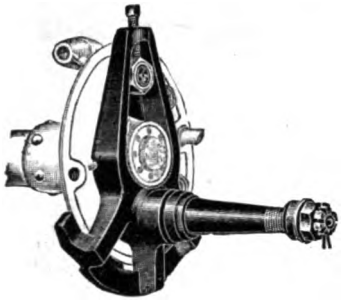
Every Up-to-Date Garage Should Have This Equipment—*Order Now.*

TRADE **EKERN** MARK

Indispensable to Garages and Machine Shops, Quick, Saves Time and Money.

You Need Them Badly — Then Insist on Getting Them

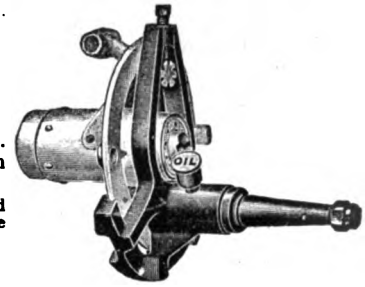
EMERGENCY AXLE STUBS FOR FORD CARS AND OTHER CARS



Emergency Axle No. 1



Emergency Axle No. 2



Emergency Axle No. 3

These devices are for bringing in cars with broken axles. With either type of axle, a car can be placed on its own wheels within a few minutes time.

The No. 1 and No. 2 axles require an extra front Ford wheel and cones, while the No. 3 uses the rear wheel and has a compression grease cup to prevent it from getting hot.

Nos. 1 and 3 are for Ford Cars.

No. 2 is for all other makes of cars.

List Prices: No. 1, $5.00; No. 2, $10.00; No. 3, $6.00

PORTABLE WORK BENCH & ENGINE STAND



Portable Work Bench

It is provided with two large trays, 22x24, for convenience, where the workman can place his tools, motor, and axle parts. The stand is mounted on three 4-inch diameter wheels. The rear castor wheel is so constructed that by pulling the plunger jim, the castor will swing up off of the floor and the stand will then rest firmly on its legs. By kicking the castor lever down, the stand will go back on its wheels and lock automatically.

A Ford assembly can by fastened to the stand the same as with our Motor Stand.

The Work Bench is also equipped with a machinist's vise, which has a 3-inch jaw with a 4-inch opening, which will handle any work required in overhauling a Ford motor or axle, also other kinds of work.

The Work Bench & Engine Stand is 36 inches high, 27x42 inches floor space.

Weight, 120 lbs. **List Price, $40.00**

MOTOR STAND

The handiest device of its kind for use in shops and garages doing Ford engine work. The Ford motor when taken from a car can be fastened to the stand by the two cap screws which screw into the side of the motor where water inlet connection is fastened. The stand is so constructed that the part screwed to the motor will revolve in the clamp on the stand and can be locked by tightening the lock-screw which will hold the motor in any position or angle desired to suit the workman. It also has a tool tray where the workman can place his wrenches or parts of the motor, if so desired. It is mounted on wheels so it can be moved from place to place. It is 34 inches high; 32x30 inches floor space.

Weight, 50 pounds.

List Price, $20.00



Motor Stand



Model K Grease Gun



Axle Attachment

AXLE ATTACHMENT

The attachment is for use on either our Portable Work Bench & Engine Stand or our Motor Stand.

By merely bolting this Attachment to the revolving part of the stands, it quickly converts them into axle repairing stands for repairing nearly all makes of automobile axles.

Weight, 9 pounds. **List Price, $6.00**



Axle Attachment

PORTABLE GARAGE GREASE GUN

Consists of a heavy seamless steel cylinder mounted on wheels, has five feet of hose attached to bottom of cylinder, with shut-off valve and nozzle at end of hose.

Register measures accurately the amount of grease put in the gear case or differential, and will work equally as well on liquid oil as on hard grease.

It is equipped with two sets of gears. When the crank is pushed in, it disengages the low gear and immediately engages the high gear which operates the piston either up or down at a high speed. To shift back into low speed, merely pull plunger and pull crank outward which engages the low speed gears.

The cylinder is 20 inches long by 6 inches in diameter, capacity 20 pounds of grease or 2½ gallons oil. The piston is covered with best quality cup shaped leather and is provided with an expansion ring in piston which prevents any grease or oil from leaking by. The piston also has an automatic air vent which releases the vacuum in the cylinder when cranking the piston up for refilling. The base is provided with a step-lock which lifts the castor up off of the floor and sets the gun rigidly while cranking.

To operate: Pull plunger and push crank in which engages quick return gears, turn crank to left until piston comes up out of cylinder, then pull plunger and swing head over to one side. Fill the cylinder with grease or oil, swing head back over cylinder, turn crank to right while high speed gears are engaged until piston reaches the grease in cylinder. Then pull plunger over crank shaft, pull crank outward, which will engage low speed gears, then set register by pushing down indicator to zero, then turn crank until you have the amount of grease desired. The register will show the exact amount of grease put in the gear case. The register can be reset at any time desired by pushing the indicator rod down to zero. When grease is used it registers in pounds and when oil is used it registers in pints. The same register is used for grease and oil.

Model K provided with a set of quick return gears and can be refilled in one minute.

Weight, 100 pounds. **List Price, $47.50**

PRICES F. O. B. CHICAGO — *DISCOUNTS TO DEALERS*



Open for Refilling

McPaco

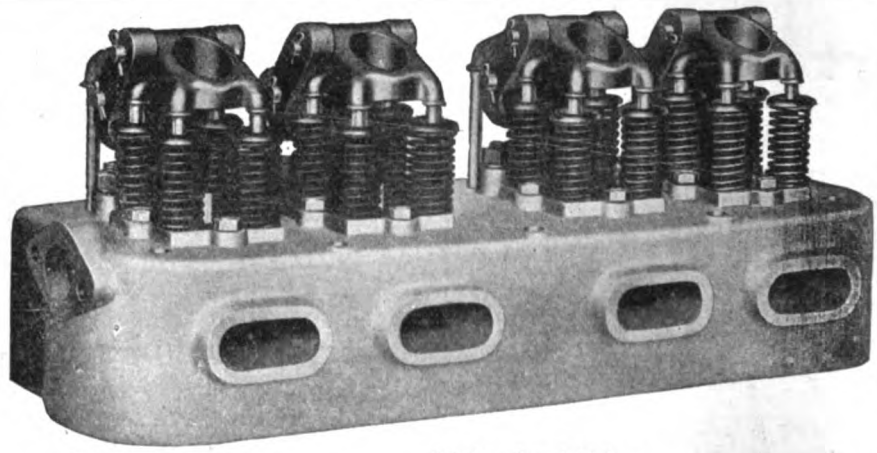
Department M

1410-12-14 So. Michigan Boulevard

CHICAGO, ILL.

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Speed to climb the steepest hills as you never dreamed of before. Power to double the value of your converted Ford truck, the load carrying capacity of which is only limited to the strength of the rear axle. Speed for the road or for the track to rival the high cost racing cars. A long list of racing car drivers, winners of speed contests, show what you can look for if you want a snappy speedster or a race track winner.

Special equipment for touring car, truck and racing car for $95.00. Extra racing equipment at special low prices. Get our quotations on high speed cam shaft, gray iron pistons, aluminite connecting rods, Lynite pistons and rings complete, counterbalances for crank shaft, nickel steel racing gears 3 to 1 ratio, special oiling systems, fast carburetors and beautifully designed racing bodies. Every Ford owner a likely prospect and every Ford converted truck owner a sure sale. An absolute necessity to every owner of a fast Ford.

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Made in the "Puncture Proof" City

NO-LEAK-O

NO CARBON—LESS FUEL—MORE POWER



See that groove controlling the oil?

Seven years of successful growth. Reputation gained through actual service. Results and popularity of NO-LEAK-O Piston Rings have brought out imitations. There are none "just as good"—insist on the original NO-LEAK-O—The successful grooved Piston Ring. All NO-LEAK-O Rings are oil-controlling rings. That's why they are superior to any other ring. Write for free booklet. Popular sizes 50c. Guaranteed to give satisfactory service or money back. Discount to the trade.

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STORAGE BATTERIES and TITAN PARTS

Fulfill every need of the Repairman. They represent the highest skill in the Art of Battery Making.

Batteries for Every Car. Parts for all Batteries of Every Make. Prompt Shipments from Stock.

Write for Bulletin.

GENERAL LEAD BATTERIES COMPANY

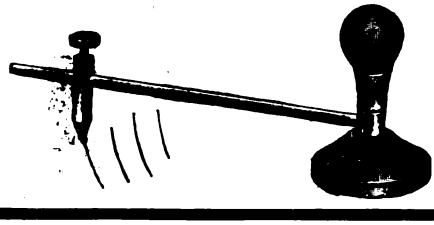
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NEWARK, N.J.

NO NEED TO KEEP A STOCK OF HEADLIGHT GLASSES

This "Red Devil" circular glass cutter cuts perfect Headlights from 2 to 20 inches diameter, from plain and plate glass, any thickness. In demand by autoists.

Style No. 033, sample 50 cents



Discount to Dealers

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Made from Oil-Tempered Spring Steel Wire



PATENTED MARCH 28, 1916

They Remove Carbon Where Others Will Not



Cut out experimenting—get down to business. Why not own a set of FLEXIBLE CARBON SCRAPERS? They are the only scraper on the market that will do a satisfactory job without taking the motor to pieces. Compounds are dangerous. All good mechanics advise scraping carbon. Over 100,000 sets now in use by Auto Mechanics.

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Send for free sample of The Automobile Dealer and Repairer.

MOTOR VEHICLE PUBLISHING CO.

71-73 Murray Street, New York

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LINK YOUR ORGANIZATION TO OURS

You need us and we need you. Combined we give your customers real service from their engines.

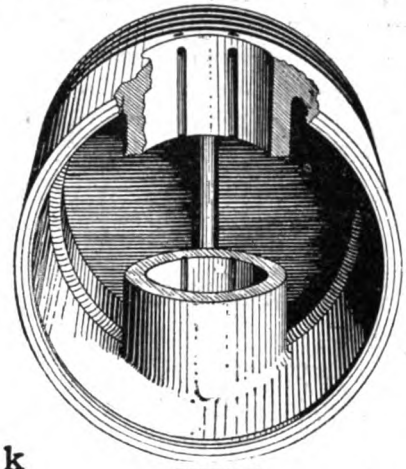
PISTONS STANDARD and OVERSIZE LIGHT WEIGHT SEMI-CAST-IRON and STANDARD CAST-IRON

For all makes and size engines with rings. A STANDARDIZED product and complete job records kept insures you of future service.



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PINS AND RINGS

Write for price list today. Liberal discount to the trade.
We have a message for every one, factory-service, distributor, garage, owner.



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BUTLER MFG. COMPANY
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Seamless Steel Tubing

Over 3,000,000 Feet on Hand.

2000 SIZES. YOUR SIZE IS HERE

ALSO COLD DRAWN SEAMLESS TOOL STEEL TUBING

WRITE NEAREST OFFICE

EDGAR T. WARD'S SONS CO.

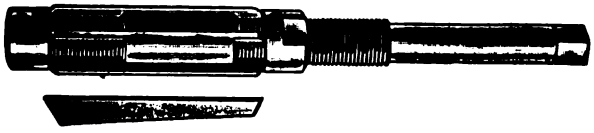
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The best made for repair work

The Critchley Expanding Reamer

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Try One and You Will Want More.



Reams odd size holes

Send for Circular

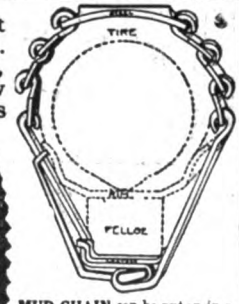
CHADWICK & TREFETHEN
82 BOW STREET PORTSMOUTH, N. H.

Hang on to your old tires. They will last as long as you live if covered with steel. The Kimball Steel Protector makes Blowouts, Punctures and Rim Cuts impossible. A few sections will hold any old blowout. Tires as flexible as ever.

Special inducements to those in new territory.







MUD CHAIN can be put on in a jiffy with one hand while standing on the run board. If you get in a mud hole you will laugh out loud. Hook the ends together and pull the little lever and they are on tight. Good for blowouts.

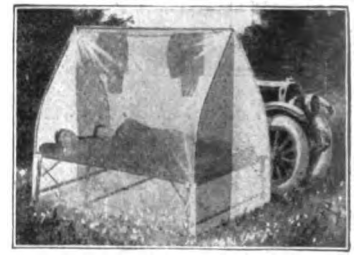
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TENTOBED rolled up in dust and water proof wrapper.

TENTOBED



Automobile tourists, campers and all outdoor folk find the Tentobed the ideal outdoor sleeping arrangement. Light, portable, compact—no stakes, ropes or poles required; positively water, mildew, mosquito and insect proof.

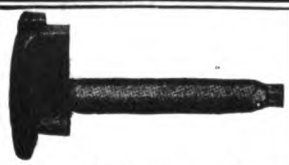
Folds up so compact that two of them may easily be carried on the running board of any automobile or conveniently packed in a canoe. Can be set up anywhere in five minutes and is entirely self-supporting. Complete in every particular and as comfortable as any bed made. Accommodates two full grown persons without crowding.

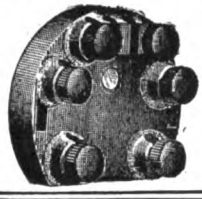
It is 4 ft. wide and 6 ft. 4 in. long—extra large bed for two adults; weight 45 lbs. Complete outfit rolls into package 4 ft. long by 7 in. in diameter. For sale by reliable dealers. Write us for descriptive circular.

TENTOBED COMPANY

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GUARANTEED MAGNETO PARTS



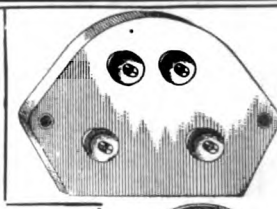


For All Makes of Magnetos, Coils, Starters and Generators

SPARK COIL PARTS TUNGSTEN CONTACTS

They represent character in design, in finish, in quality of material, workmanship and mechanical excellence.

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Have your Message for the Country Blacksmiths go Straight to the Mark!

IF YOU MANUFACTURE AUTO EQUIPMENT

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YOU'LL GET GOOD RESULTS!!!

Plenty of room for big display—size of advertising space on a full page is 14x9½ inches—you can figure out right now just what you can do in a space that big. Send for a sample copy and full particulars—sit right down and do it now—then you'll be sure it has not been forgotten.

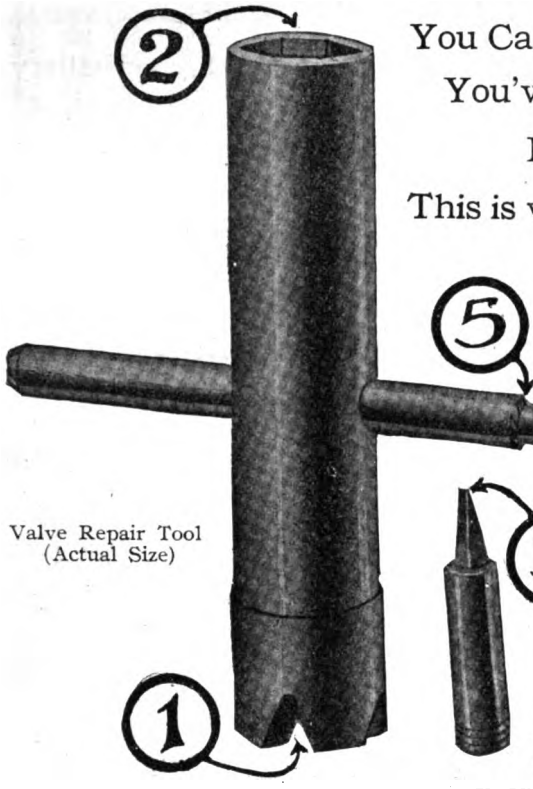
M. T. RICHARDSON COMPANY

Publishers of the Blacksmith and Wheelwright

71-73 MURRAY STREET NEW YORK CITY

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A. & H. VALVE TOOLS



Valve Repair Tool
(Actual Size)

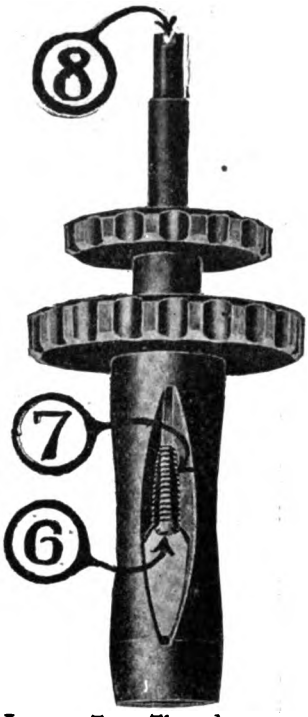
You Can't Get **Along Without Them**
You've Been **Looking For Them**
HERE **THEY ARE**
This is what YOU can do with them:

1. Recut outside stem threads.
2. Take off hexagon nuts.
3. Remove broken plungers.
4. Remove broken plungers.
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6. Recut inside plunger threads.
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A Wonderful Combination
Two Tools for $2.00
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$1.13 each if bought separately
List $1.50 Each

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True Threader
Tool
(Actual Size)

A PATCH

That Will Not Loosen, Leak Creep or Blow Out!



20th CENTURY
Self-Vulcanizing Patch

Makes Permanent Repairs Instantly, and Without the Use of Heat or Tools

It is a three-ply Patch, using a ply of raw Red Rubber next to the inner tube, which guarantees a quick, smooth job of vulcanizing; then a ply of semi-cured rubber next to the khaki cloth. This rubber is not affected by the heat and will not melt, making our Patch absolutely **Leak-Proof;** then comes the ply of best grade khaki cloth, which gives the Patch its strength and durability.

This Construction Makes a Patch We Guarantee Not to Loosen, Leak, Creep or Blow Out, and to Give Satisfaction in Every Respect.



Leak-Proof

Made in 4 sizes	2¼ x 16— 36 Square Inches	$0.50
	4 x 15— 60 Square Inches	.75
	6 x 18—108 Square Inches	1.50
	7 x 75—525 Square Inches (Garage Size)	4.00

If you want a Patch, call for a "20th CENTURY." We make all kinds of Patches, all Sizes and Prices.
If your JOBBER or Dealer has not got them, write to us direct.

20th CENTURY TIRE PROTECTOR CO., MIDLOTHIAN, TEXAS

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JEWELL BATTERY GAUGE

The manufacturer of your car warns you to watch your battery by testing at least twice a month.

Do you do it? Very few car owners do, with the result of poor battery service and often ruined batteries.

The JEWELL Battery Gauge tells the condition of your battery ***all the time,*** as plainly as your speedometer tells the speed of your car, and relieves you of the trouble and inconvenience of messy hydrometer tests.

The cost is Six Dollars—its value inestimable.

If your dealer is a dead one, write us and we will mail you one upon receipt of price.

Dealers Note. We offer you the best selling and most practical accessory ever put on a car.

WRITE TODAY FOR DETAILS.

Manufactured by

THE JEWELL ELECTRICAL INSTRUMENT CO.

1646 W. WALNUT STREET, CHICAGO

Exclusive Sales Representatives, GRAY-HEATH CO., 1440 Michigan Ave., Chicago

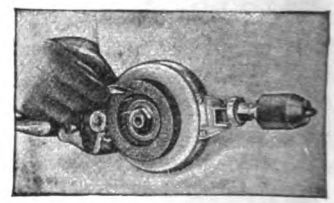






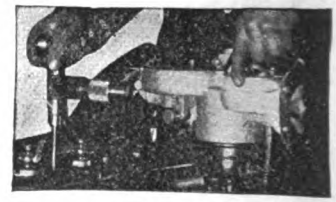
Temco Garage Outfit

Electric Drill
Emery Wheel } **All in One**
Valve Grinder



This Garage Outfit is making a hit all over the country, cutting cost, increasing capacity and boosting profits.
You will have dozens of uses for the Temco Garage Outfit every day in the year.

It Drills—Taps—Grinds Valves—Sharpens Tools



PORTABLE—you take the tool to the job—not the job to the tool. Attach to any electric light socket (D.C. or A.C.), and it's ready. Starts—Stops—Reverses instantly by finger switch on tool.

Also grinders, tool post grinders, buffers and larger drills.
Temco Tools always satisfy.

Write today for catalog or see your jobber.

THE TEMCO ELECTRIC MOTOR COMPANY

302 SUGAR STREET, LEIPSIC, OHIO

TEMCO Garage outfit

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NATIONAL PRESTIGE

of National Rubber Tire Filler was won through exceptional performance in forever eliminating the bugaboo of auto pleasure—punctures and blowouts.

Made of Pure Rubber, cut in small particles treated, moulded and vulcanized by our special steam process. Fits all the different size casings. No inner tube and air used, eliminating the cause of all tire trouble. Stops the expense of buying, repairing and replacing the inner tubes. Doubles the life of the casing—reducing the cost one-half. Can be transferred and re-transferred as often as is necessary. Has been sold throughout the U. S. and many of the Foreign countries for six years. Has years of actual service record back of it. It has all the easy riding qualities of the air-filled tire, with none of its faults and uncertainties. No waiting to use your car; it is always ready whenever you need it. Let us send you small sample and tell you more about it.



NATIONAL RUBBER FILLER CO.
208 College Street **MIDLOTHIAN, TEXAS**

DEALER AIM

Reflex equipment on motor-vehicles doing responsible work everywhere—stands PROOF of the *accomplishment* of the Reflex makers AIM to produce a plug to sell on consistent performance.



REFLEX SPARK PLUGS



Reflex selling advantage. A Reflex equipped White Truck mounting an anti-aircraft gun.

The features and assembly of Reflex Plugs—the Chromite porcelain and Non-pit points used used in their construction—are why dealers sell these plugs on actual service. Reflex dealers point to their daily use on truck fleets everywhere.

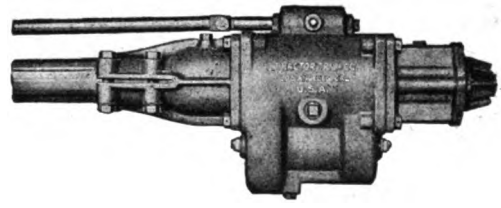
Sell this same, trusted, satisfactory ignition to your trade. You are authorized to sell Reflex Plugs—any type of the complete line—on a money-back guarantee. Inquire for your territory today.

THE REFLEX IGNITION COMPANY
1711 Payne Avenue **Cleveland, U. S. A.**

"MOORE"

Full Roller Bearing

AUXILIARY TRANSMISSION FOR FORD CARS



The Quality Transmission that stays Sold.

Gives 4 forward and 2 reverse speeds to Fords.

An ***Intermediate Speed*** for Hill climbing. An ***Emergency Low*** to pull you out of sand or mud, a ***Positive Neutral*** for easy cranking.

A Money-Maker for Live Dealers

Easy installation. No machine work or brazing. Price $65 with attractive dealer discount. Write us today.

TRACTOR-TRAIN CO.
1347 Wall Street - - Los Angeles, Cal.

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PROTEX GAUGE

Is an Infringement of

MARTIN GAUGE COMPANY'S PATENT No. 1,220,272

On April 24, 1918, Judge A. L. Sanborn, of the United States District Court in Chicago, handed down a decision in our suit against the Protex Manufacturing Company, Charles Friedlander & Co. and Albert E. Pollock, holding that the Protex gauge is an infringement of all of the claims of our patent No. 1,220,272, awarding us an injunction against all of these concerns and individuals, and an accounting of profits and damages with costs.

This was notwithstanding the fact that the Protex Company has had a patent issued first.

We wish to warn the trade against handling the Protex gauge, as any one so doing is liable for an action for infringement.

MARTIN GAUGE COMPANY

CHICAGO, ILLINOIS



THE GREATEST

AUTO REPAIR SEASON EVER KNOWN

This will make advertising doubly and trebly valuable this year in the Automobile Dealer and Repairer, "The best little trade puller of them all."

JUNE IS A BIG MONTH FOR POSITIVE RESULTS!!!

Do not wait for the mail. Wire us at our expense and we will send you rate card and full particulars. Get in the June number—circulation more than 30,000 copies.

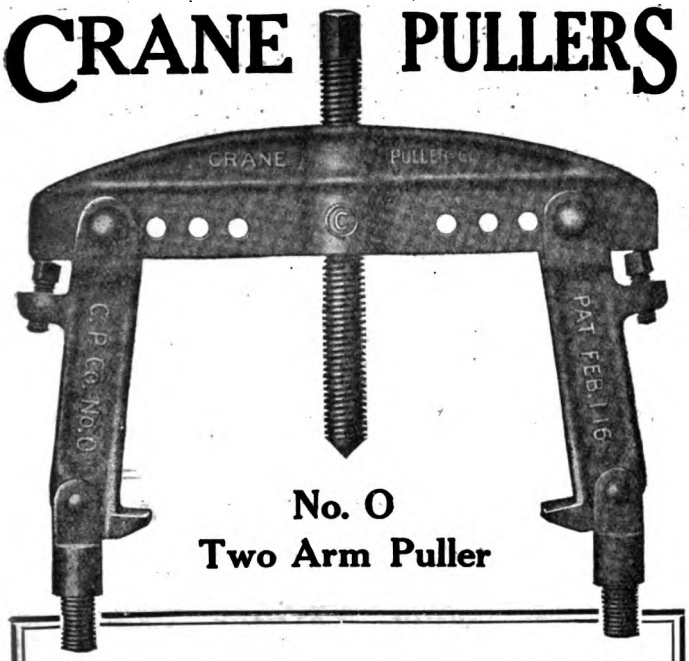
Yours for more business,

MOTOR VEHICLE PUBLISHING CO.

71-73 Murray Street, New York City

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CRANE PULLERS



No. O
Two Arm Puller

Removes All Kinds of Small Parts Easily and Quickly

For the removal of timing gears, magneto and pump shaft gears—all small work, in fact, that is designed to be removed by stud-bolts screwed in tapped holes in the web, in addition to the regular functions of the ordinary puller—no device is comparable in efficiency and simplicity to the new

No. O
TWO ARM PULLER

The forked stud-bolts, shown attached to the hook end of the arm with pins, are furnished blank and can be drilled and tapped by the user for the proper thread of his work. Case-hardened headless set screws can be used for the stud.

This puller takes light work 5 inches in diameter and 3 inches from the end of shaft. It has the new patent Locking Arms, forked stud-bolts and case-hardened screw.

List Price $2.50

from your jobber

CRANE PULLER COMPANY

Designers of Wheel and Gear
Pullers for Every Purpose

54 Lake Street Arlington, Mass.
U. S. A.



"Is Ford making his chassis out of rubber, Al?"

"I'll bite—what's the merry come back?"

"No! No! I'm serious. Look at that Ford delivery rig. It's as long as a freight car. Someone has gone and stretched it at least a yard."

"Say, defective eyesight will keep you out of the trenches. Is that the first Hay-Dee Extension Ford you've seen? Hundreds of them are working in New York."

"Just what is a Hay-Dee Extension?"

"Hayes-Diefenderfer massage a Ford chassis until it has a 130-inch wheel base—their method is so ingenious that not a hole or a cut is made on the Ford frame and the chassis has actually been strengthened. Then they mount a body from 90 to 118 inches of loading space back of driver's seat and a Rolls Royce finish and sell the whole job under $900."

"That doesn't include the Ford, does it?"

"It certainly does. If you own a Ford chassis, they will allow you full price of a new one on the deal."

"All their prices are subject to change in 10 days without notice."

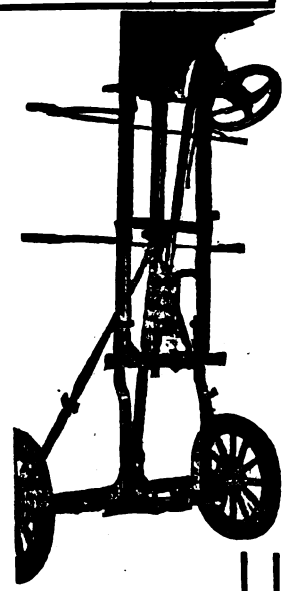
"Great Scott! that's the kind of an outfit I need. Quick! lead me to it before I wake up."

Hay-Dee Extensions

can be attached by anyone, with a wrench.

Eliminates the overhang and the frame is strong as ever.

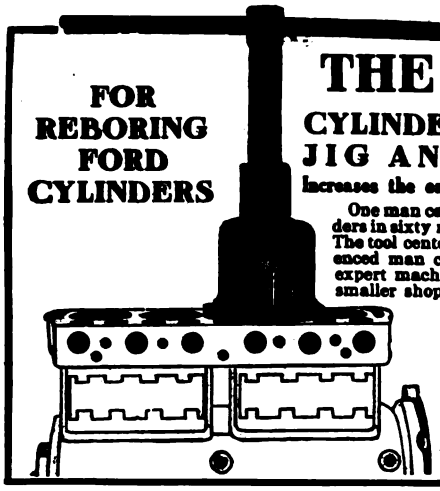
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HAY-DEE Extensions For FORDS $55 and $60

HAYES & DIEFENDERFER
1872 Broadway New York City

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FOR REBORING FORD CYLINDERS

THE DAVIS

CYLINDER REBORING JIG AND REAMER

Increases the earning power of your shop

One man can rebore a set of four cylinders in sixty minutes with this machine. The tool centers itself, and an inexperienced man can do as good a job as an expert machinist. With this tool the smaller shops and garages can rebore cylinders and guarantee the work to be as good as the larger dealers with their expensive machinery. Makes the motor better than new. Write for price and full particulars.

The Hinckley Machine Works
Hinckley, Ill.

GOOD TIRES AT CUT RATE PRICES



High grade, firsts—not seconds, not blemished or rejected tires, but good tires; tires that will bring every user back for more. Sold without guarantee.

RIBBED TIRES

At these prices are the biggest bargains you ever purchased in your life—Think of it!

PRICES TO DEALERS:

	Non-Skid	Tubes		Non-Skid	Tubes
30x3	$ 8.00	$1.90	32x4	$16.10	$3.05
30x3½	10.25	2.15	33x4	16.80	3.10
32x3½	12.00	2.25	34x4	17.25	3.20

Write now for dealers' proposition, or better yet, rush in a trial order with Chicago or New York draft, express or P. O. money order. If you prefer, send 20% of amount with your order and we'll ship goods C. O. D. subject to examination. Investigate this now. Let us tell you how we can do it.

BUDRICK RUBBER CO.

Dept. B, 36 S. State St., Chicago

NEW COOLING SECTIONS

FOR RADIATORS.

A new square tube honeycomb cooling section will make your radiator new again.

Ask us for information.

ROME TURNEY RADIATOR CO.,

Whitesboro Street **ROME, N. Y.**

INSURANCE AGAINST TROUBLE



MOTOR SASCO STRAINER



KEEPS DIRT AND WATER OUT OF THE CARBURETOR

This means a steadier running MOTOR and the elimination of many mysterious stops while on the road.

MOTORISTS have learned that a perfect strainer is an absolute necessity, and so thousands are sold every day.

HOW MANY ARE YOU SELLING?

Attractive dealers' proposition. Write for full details.

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SAGE BROS, Inc., 780 Union St., Brooklyn, N. Y.



THE
BENTON
"THE CASE-HARDENED PLUG"

An unbreakable, wound mica insulator quickly cleaned by opening metal-to-metal joint and scraping or washing mica. Joint always gas tight. No deterioration from cleaning. Case-hardened wrench and thread surfaces. Service guaranteed.

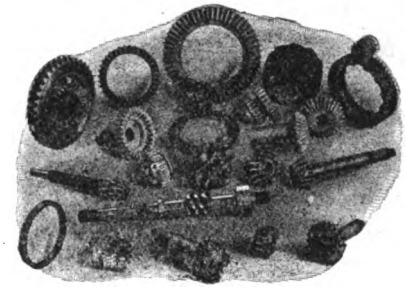
Price $1.00

Write for our liberal Agency Proposition and a copy of Booklet shown.



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VERGENNES, VERMONT

IF YOU WANT THE DEPENDABLE KIND OF DIFFERENTIAL AND TRANSMISSION GEARS AND SPROCKETS



That can be relied upon to be accurately machined, and of the highest grade material, to fit all makes cars,

Write for prices and terms to

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CHICAGO, ILLINOIS

B-W DIRECT CURRENT



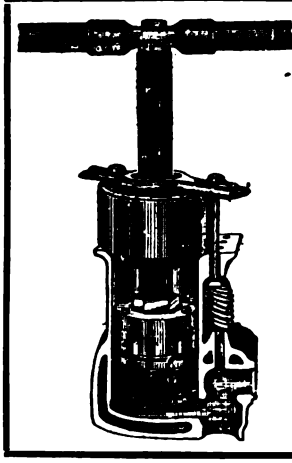
STURDILY CONSTRUCTED to retain accuracy under the most severe conditions. Handsome in appearance. Made in both flush and surface types. Finished in bright nickel or black rubberoid as desired.

Better Ammeters Cannot Be Purchased, PRICE..... $1.90

Send For Literature

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AMMETERS



Make More Profits

BY USING

STORM Reboring Machine

The most practical machine for any type of motor. SIMPLE, SPEEDY, ACCURATE and RELIABLE for hand or power. No shop complete without one. In daily use in all parts of U. S. A. and foreign countries.

Shortage of new cars make it indispensable in large and small shops. We furnish machines of varied capacities from 2⅝" up. Also special Ford Machine. For sale by leading jobbers. Oversize pistons for all makes of motors.

For further information write

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Hotel Winton

When you are in Cleveland stop at the newest and finest hotel in the city.

600 Rooms—600 Baths

$2.00 Up

To be complete your trip must include a visit to the Famous Rainbow Room.

HOTEL WINTON
C. M. SNYDER, Managing Director
Prospect Avenue at East Ninth
CLEVELAND



END THE TROUBLE NOW

BY INSTALLING

F. W. S. TAPER ROLLER BEARINGS

— IN —

FORD AND CHEVROLET 490

FRONT WHEELS

$10.00 Per Set of Four Bearings

DEALERS WRITE FOR DISCOUNTS



THE BEARINGS SHOP
1402 Michigan Ave.
Chicago

BALL BEARINGS
All Sizes and Makes

UNCLE SAM DEPENDS UPON YOU

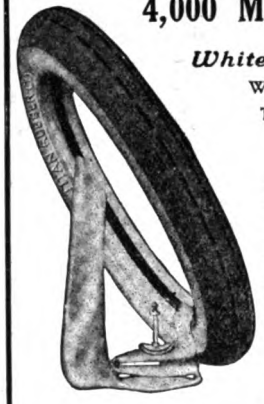
He expects you to do your part in keeping the 4,000,000 cars already in use up to top notch efficiency. It's up to you to make good.

PRESSURE PROOF PISTON RINGS

Will be an invaluable ally. They'll restore the motor's power. Permanently stop carbon and cut the consumption of oil and gasoline to a minimum.

"New Facts About Piston Rings" will tell you why. It's free to you

PRESSURE PROOF PISTON RING CO.
169 Massachusetts Avenue Boston, Mass.



4,000 MILE GUARANTEED BOND

Issued With Every

White Hand Molded Titan Tire

When ordering, state style wanted. Clincher or S. S.

Titan Gray Laminated Inner Tubes are unconditionally guaranteed against defect or leakage.

Size	User's Prices Tires	Dealer's Prices Tires	User's Prices Tubes	Dealer's Prices Tubes
30x3	$17.50	$10.92	$3.25	$2.12
30x3½	21.35	13.87	3.75	2.43
32x3½	24.95	16.22	4.10	2.60
31x4	33.30	21.64	5.00	3.35
33x4	35.70	23.20	5.35	3.48
34x4	36.45	23.69	5.50	3.57

Send 25% with order, balance shipped express C. O. D., or take 2% off and send full amount with order and save return express charges.

TITAN RUBBER CO.
Dept. H, 1425 Michigan Ave., Chicago, Ill.

AUTO MAILING LISTS

44,755	Auto Dealers, U. S	$75 00 or $2.50 per M.
8,102	Ford Dealers, U. S	18.50 or 3.00 per M.
5,519	Truck Dealers, U. S. (Showing make of truck handled)	12.00 or 3.00 per M.
150,000	Truck Owners	7.00 per M.
5,400	Truck Owners in Chicago	15.00 or 3.50 per M.
4f 943	Garages, U. S	75.00 or 2.50 per M.
55,967	Auto Supplies, Retail, U. S	90.00 or 2.50 per M.
45,054	Repair Shops	75.00 or 2.50 per M.
404	Auto Manufacturers	3.00
73,674	Auto Dealers, Garages, Supplies and Repairs in one list, no duplicates	$125.00 or 2.50 per M.
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SPECIALISTS IN MOTOR CAR WRENCHES

GUARANTEED SERVICE TOOLS

JOBBERS—DEALERS EVERYWHERE, ASK THEM

SEND FOR CATALOG No. 100.

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Leave Your Tube in the Vulcanizer
AND WAIT ON YOUR CUSTOMERS
Why Not?

AMERICAN AKRON

Famous Five-Minute Cure Cement

WILL CURE IN FIVE MINUTES

Will Not Overcure, If Left in the Heat for One Hour

Put Up in Seven Size Containers
Made in Two Grades—Red and Gray
Recommended for Both Casing and Tube Repairs

IF YOUR VULCANIZER IS YOUR BOSS, DECLARE YOUR INDEPENDENCE TODAY

Write for Prices

The American Rubber & Tire Co.
AKRON, - - - - - OHIO



SMITH AUTO SIGNAL

"You know which way he is going"

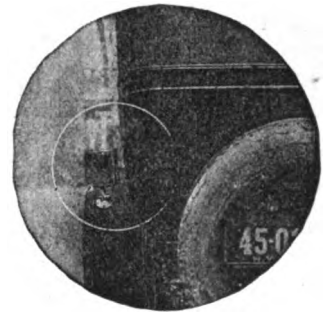
The Signal is placed only on the left rear fender and shows the words LEFT, RIGHT, or STOP in red, two sides—both front and rear, day and night.

The Smith Auto Signal provides the best and cheapest insurance obtainable. It *prevents* the accident. Light, compact, decorative as well as serviceable.

Operates from plainly marked single-handle, three-way switch. Simply constructed—nothing to get out of order. Easily installed—directions with every signal.
Already used on half the makes of cars.

There are *15 Reasons* and more why you should use the
SMITH AUTO SIGNAL.
Further particulars upon request.

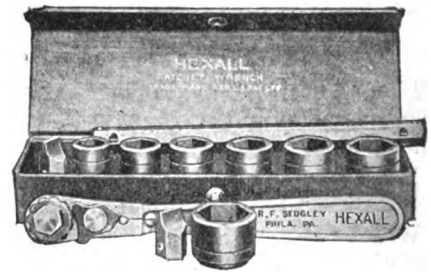
SMITH SIGNAL CORP'N
WEISS and SINCLAIR
U. S. Distributors
53 West 66th Street
New York



Rear View of Car
Showing Smith Auto Signal

Representatives Wanted

"HEXALL" No. 2
Trade Mark Reg. U. S. Pat. Office.
RATCHET SOCKET WRENCH



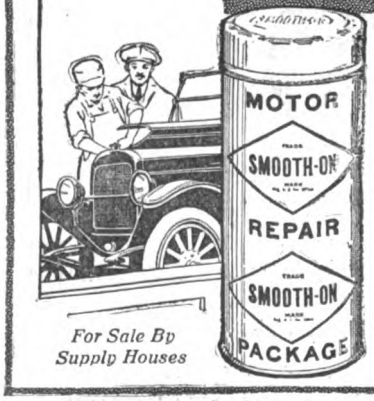
Don't try to get along with just what you've got when there's a better wrench in the market. "Hexall" is sold for what it is—not for what it pretends to be. The belief that a real sale is made on any other basis than by satisfying the customer is dead so far as "Hexall" is concerned.

"Hexall" No. 2 contains—7 in. steel forged handle, 2 screw-driver bits, 7 in. extension bar, 7 hexagon sockets. Packed in neat strong cloth case.

Send for catalog. *"Break any Sedgley Wrench and we repair it—no charge."*

R. F. SEDGLEY, 2311-13 NORTH 16th ST., PHILADELPHIA, PA.
Pacific Coast Representatives, McDonald & Linforth, 739 Call Building, San Francisco.

SMOOTH-ON



For Sale By Supply Houses

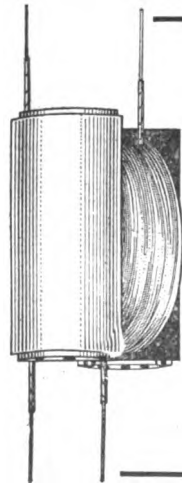
IRON CEMENTS Nos. 1 and 3

For Permanent Repairs on Automobile Motors and Parts

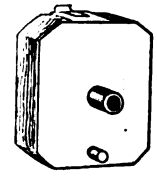
Repairs leaks in water jackets, boilers, tanks, screw-thread joints, flanged joints, etc., also for keeping nuts and bolts tight. Expands and contracts with the metal to which it is applied and not affected by heat, cold, water, gasoline or oil.

Complete Repair Package contains one 1-lb. can SMOOTH-ON Iron Cement No. 1, one 1-lb. can SMOOTH-ON Elastic Cement No. 3, one roll Tape, one 144 page Instruction Book. . . $2.00

Smooth-On Mfg. Co., Jersey City, N. J.
Chicago, 221 N. Jefferson Street
San Francisco, 36 Sacramento Street



OUR HIGH TENSION
Windings and Condensers



are fully guaranteed and equal if not superior in every detail to those of the orginal manufacture, as we make a specialty of rewinding Armatures and Coils for all makes of Magnetos.
These departments we have greatly enlarged—which is the best proof that we satisfy our customers.

Special Attention to Dealers and Magneto Repairmen
Write to us for Details

MAGNETO WINDING COMPANY
Manufacturers and Repairers
1723 Eighth Avenue Brooklyn, New York

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COTTER TYPE

TRANSMISSION CHAIN

For Motor Trucks and Tractors

No other Detachable Type Approaches the "Whitney" in Popularity.



Our years of experience in chain making, our selection of only the best materials, our special processes of manufacture, and our rigid system of inspection, all combine to make "Whitney" chains the leaders in their line.

Convenience **Accuracy**
Durability **Economy**
Strength **Reputation**

THE WHITNEY MFG. CO., Hartford, Conn.

Chains **Keys and Cutters** **Hand Milling Machines**

Battery Charging Pays Big Profits



Figure it out for yourself! This HB 500-watt Battery Charger will recharge 1 to 7 batteries at a time. Current costs only 12c to 15c per battery. Autoists pay 75c to $1.50. Your profit is 60c to $1.35 on every battery you charge. HB Users are making from *$40 to $60 clear profit every month*, and with more last year's cars in use and more batteries to be recharged, *earnings are increasing all the time.*

$15 Puts This Money-Maker in Your Garage

Balance in 9 monthly payments of $20 each, which earnings should easily more than pay. Tear out this ad and send it with name for full particulars or send initial payment of $15 with trial order. Under *absolute money-back guarantee*, you run *no risk.*

Put in an HB Charger. You can operate it easily from your city current or engine, without any electrical or mechanical experience, and it means *big profits quickly made.* Don't put it off. Order from this ad. *Write or wire us today.*

HOBART BROTHERS COMPANY

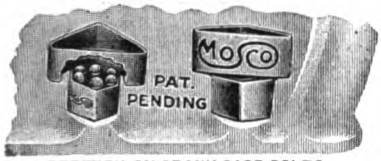
Box D5, - - Troy, Ohio.

MOSCO SPECIALTIES

Mosco Socket Nut and Bolt Holder for Ford Car

A REAL TIME SAVING DEVICE. Takes the place of that other man whose help is usually required for this operation.

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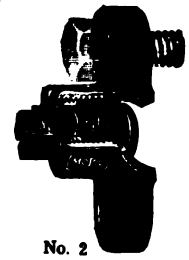
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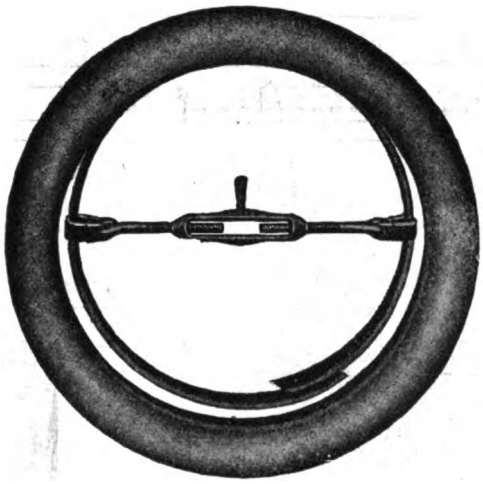
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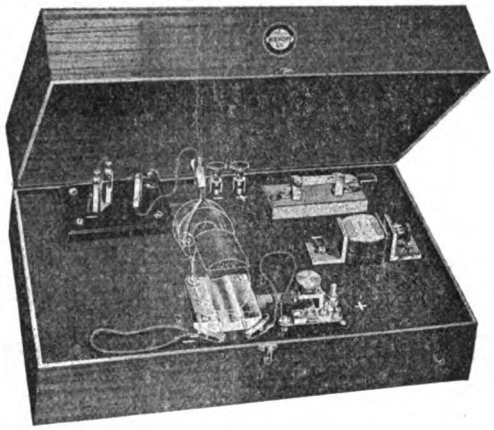
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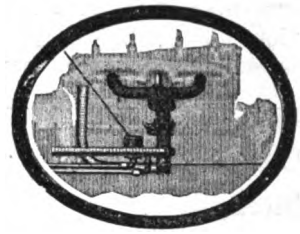
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E	2	1	12	8½
F	2¼	1¼	12	10
G	2½	1½	12	11½
H	2¾	1¾	12	12¾
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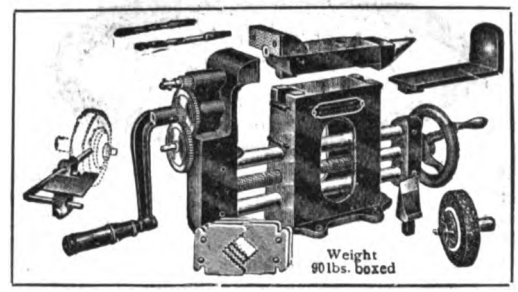
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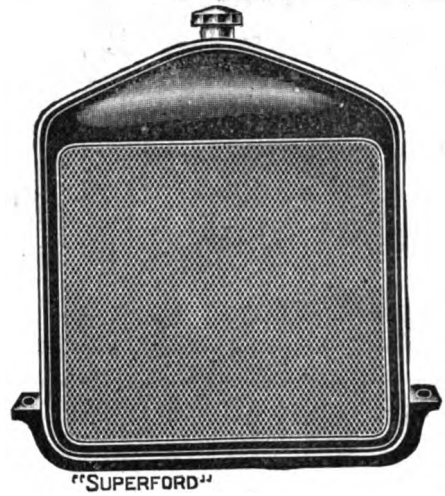
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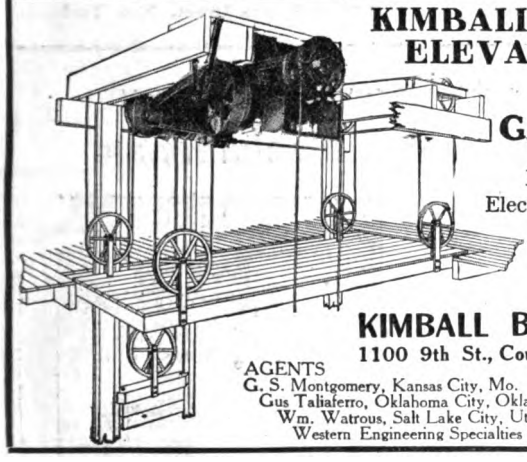
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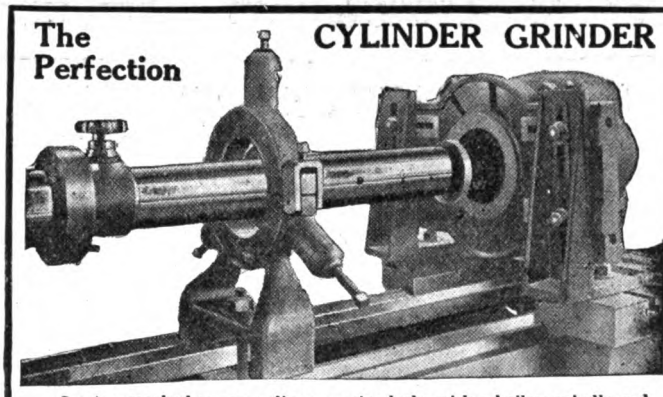
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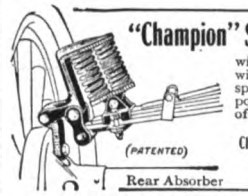
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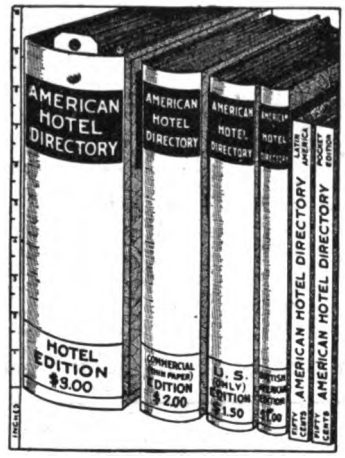
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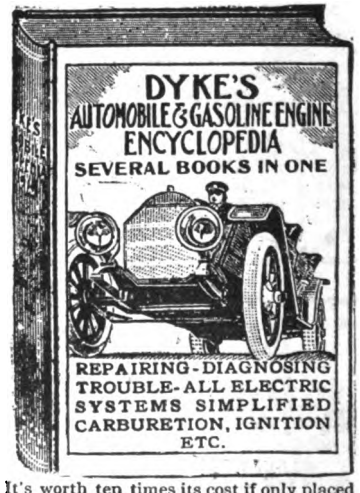
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35 x 4½	21.00	4.00	8.50	1.80	10.15
36 x 4½	18.95	4.00	8.00	1.85	10.40
37 x 5	21.50	4.00	9.50	2.10	11.50

All tires 10% more for Non-Skid. Other sizes in proportion.

Open Evenings and Sundays.

One dollar or deposit sufficient to cover express cost required with each order.

Shipments Made Promptly
Subject to Inspection.

AUTO NEEDS CO.
1602 S. Michigan Ave. Chicago, Ill.
Dept. P1.

GET ANOTHER 5000 MILES OUT OF YOUR OLD TIRES
Stop throwing away your money!

Save your old tires; for they mean dollars and cents to you. It makes no difference whether they are sand blistered, punctured, rim cut or blown out, McDaniel will put them back on the job.

Simply send your old tires prepaid to the address below, with your name and address attached. When the tires are received at the McDaniel plant they are carefully examined by experts and all necessary repairs are made. The better cover is telescoped over the other one, then the bead is cut from the outer tire and both are firmly locked together by the SPECIAL McDANIEL DOUBLE TREAD PROCESS. Your old tires are now made into one good tire ready to give you thousands of miles extra service.

DO IT NOW—Send us your worn out tires by prepaid express today and save this extra money.

SIZE	If You furnish 2 Casings	If You furnish 1 Casing	If I furnish Both Casings	Special Gray Tubes
30x3	$3.25	$5.00	$6.75	$1.90
30x3½	4.00	6.00	7.25	2.40
32x3½	4.25	7.25	9.00	2.55
31x4	4.50	7.75	9.50	3.10
32x4	4.75	8.00	10.00	3.20
33x4	5.25	8.25	10.25	3.30
34x4	5.50	8.50	10.50	3.40
36x4	5.75	8.75	11.00	3.50
34x4½	5.75	9.00	11.50	4.10
35x4½	5.75	9.25	12.00	4.25
36x4½	6.00	9.50	12.50	4.35
35x5	6.25	10.50	13.50	5.00
37x5	6.50	11.50	15.00	5.40

Leo McDaniel Rubber Co.,
804 Commercial Ave., CAIRO, ILL.

WITTE Kero-Oil ENGINES
Immediate Shipment
Direct from Factory—SAVE $15 TO $200—
Simple in construction, strong and powerful, few working parts--easy to understand, easy to operate, easy to own. Buy practically on your own terms--Cash, Payments or No Money Down. 90-Day Trial--5 Year Guarantee. Write for latest prices.--ED. H. WITTE,
WITTE ENGINE WORKS
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APPLY A NEW TOP COVER
TO YOUR OLD CAR AND MAKE IT LOOK NEW.
Price $8.00 to $17.00. Parcels Post Paid.
You Save ⅔ price of a new Top, and can apply it yourself. Why sacrifice your old car? Many are better than the new ones. Get our catalogue. It's a money saver.
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BAILEY BALL THRUST
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EMPRESS OIL and GREASE CUPS
Marine, De Luxe, Plain, No. 249, Leather Packed, Short Pig. Marine, Invisible Ratchet, Spring Cap, Spring Lock, Wire Lock, Ratchet, Wing Top
Style "A" O.C. Style "B" O.C. Style "D" O.C. Style "N" O.C. Style "L" O.C. Style "K" O.C. Style "C" O.C. Style "G" O.C.
BOWEN PRODUCTS CORPORATION, Auburn Division,
Successors to BOWEN MANUFACTURING COMPANY, Auburn, N.Y. *Catalog on application.*

Knowlson's Spring Spreaders

No. 1. Nickel Plated and polished.... $1.50
No. 3. Gun metal finish..... $1.00
SPRING LEAF LUBRICATOR CO. 1000 Forest Avenue, Ann Arbor, Mich.

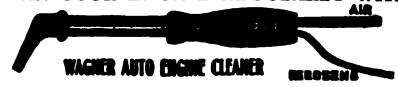

Victor TRADE MARK SPOTLAMPS
Doors in styles to match your car lamps. Mirrors flush with streamline bodies. Cutler hammer switch and many other features, at $5.00.
The Corcoran Victor Co., 708 Reading Court, Cincinnati, O.

INDESTRUCTIBLE
Ever Safe Emergency Brakes for Ford Car
Adjustable. Will fit any Model T Ford, old or new. Absolute safety. Wide range adjusting shims.

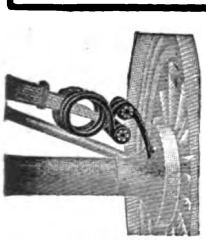

For rear wheels—made of band steel.
Asbestos lined, per pair..... $2.50
Brass lined, for extreme conditions, per pair $3.50
Extra flexible interchangeable metallic linings (ready to attach), per pair..... $2.25
Unconditional Guarantee
No changes to make—installing directions on every box.
See your dealer; he has them.
Insist on the Ever Safe.
Pat. April 30, 1918
Never Break Products Co., Bangor, Penna.

STOP THE SPRING BREAKAGE.


It's a poor policy to risk repeating the annoyance of a broken or weak spring—and the delay—by saving only a very little in buying or selling a *cheaper* spring instead of a "NEW ERA *BETTER* SPRING."
Don't replace a broken spring with one no better.
Wise dealers—sell only the best—
New Era "BETTER" Springs are the oldest and largest used line for replacement—at same price as from car factories. Made for all cars, GUARANTEED one year against breakage or sagging, graphited between leaves for two years' lubrication.
Write for complete line, discounts—or state requirements and class of business.
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CLEAN YOUR ENGINE REGULARLY WITH A


One qt. kerosene and 6 lbs. air pressure cleans all dirt, grit and grease from engine. Prevents wear, actually saves half the usual repairs. Quick, economical, thorough, easy and cleanly to operate. Necessity for repair shops.
Wagner Specialty Co., 1903 Broadway, New York City


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BEST BY TEST
For Ford, Maxwell, Studebaker, Pierce Arrow and All Cars.
Write for Agents Proposition and Prices
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Nation-wide Service on Bearings
Timken—Hyatt—New Departure Bearings for All Cars
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Cox "Splash-Pan" Type
BUMPERS
For Chalmers, Hupmobile, White, Mitchell, Oldsmobile, Studebaker, and the constantly increasing number of other cars with splash pan extended to the end of frame.
Write for prices on the whole line.
COX BRASS MANUFACTURING CO.
Home Office and Factory: Albany, N. Y.


INSYDE TYRES
Inner armor for automobile tires. Prevent punctures and blowouts. Double mileage of any tire, old or new. Easily applied without tools. Used over and over in several tires. Will not heat or pinch. Cheaper and better than double treads, etc. Details Free. *Distributors and Agents Wanted.* Sales Guaranteed. Liberal Profits.
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A good, sincere proposition to dealers. Write today.
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INEXPENSIVE. F. O. B. DESTINATION. SAMPLES FREE.
WE HAVE SOLD MILLIONS OF OUR COUPON BOOKS!
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BIG TIRE PROFITS

FOR DEALERS WHO SELL

KIMBALL TIRES

Read This, Mr. Dealer:—

Don't you want to make some real tire money? Then stop handling a few high priced tires that sell slowly and tie up your capital. Meet the cut-rate tire dealers on their own ground. Sell new clean firsts at the prices others get for seconds. Do a big business and turn over your capital several times a year.

KIMBALL TIRES are built to meet the demand for *good* low priced tires. Big dealers in New York, Chicago and other large cities are making more money on this kind of tires than they can make on high priced goods. Why don't you do the same?

You can't compete with the factory branches, distributors and preferred dealers on high priced tires. You can't compete with the mail-order and cut-rate houses on seconds. SELL KIMBALL TIRES and you can beat them both.

There is room for a live KIMBALL dealer in every city and town in the United States. We allow only one dealer in each territory to sell KIMBALL TIRES. Many exclusive KIMBALL dealers are now doing a big business but there is still choice territory to be had. But it is going fast.

Get in touch with us. Send sample order at once. We guarantee our tires to be new firsts and will refund your money if tires are returned in five days in the condition in which they were received. Don't delay.

THE PRICES SPEAK FOR THEMSELVES

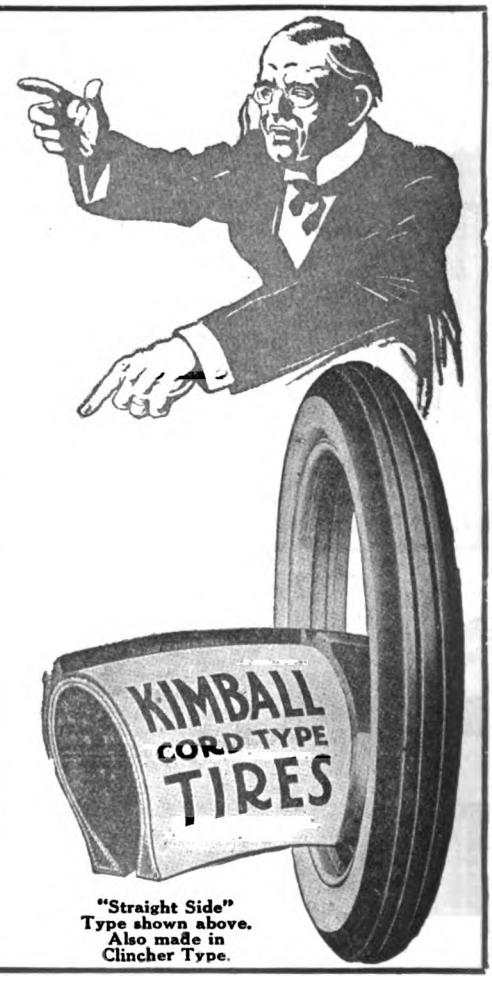
	Non-Skid	Tubes
30x3	$ 8.25	$1.90
30x3½	10.35	2.15
32x3½	12.45	2.25
32x4	16.45	3.05
33x4	17.55	3.10
34x4	18.25	3.20

The Kimball TIRE & RUBBER CO.

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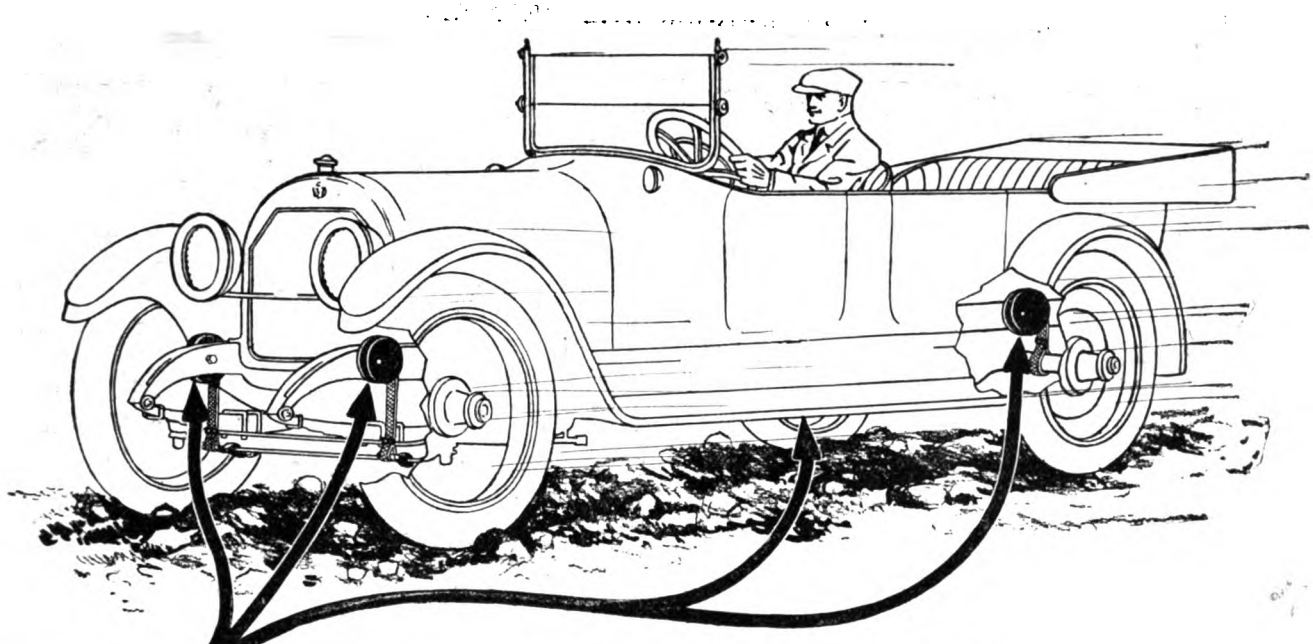
Do you want Clincher or Straight Side?

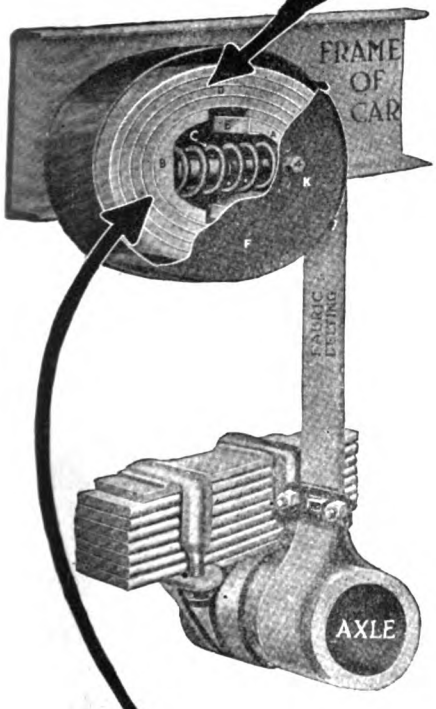
Don't delay. Mail your order today



"Straight Side" Type shown above. Also made in Clincher Type.

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SAVE—

Both your Car and your Comfort by equipping with

GABRIEL SNUBBERS

Make Your Car Ride Easier and Last Longer

$18, $24, $30 per set of four

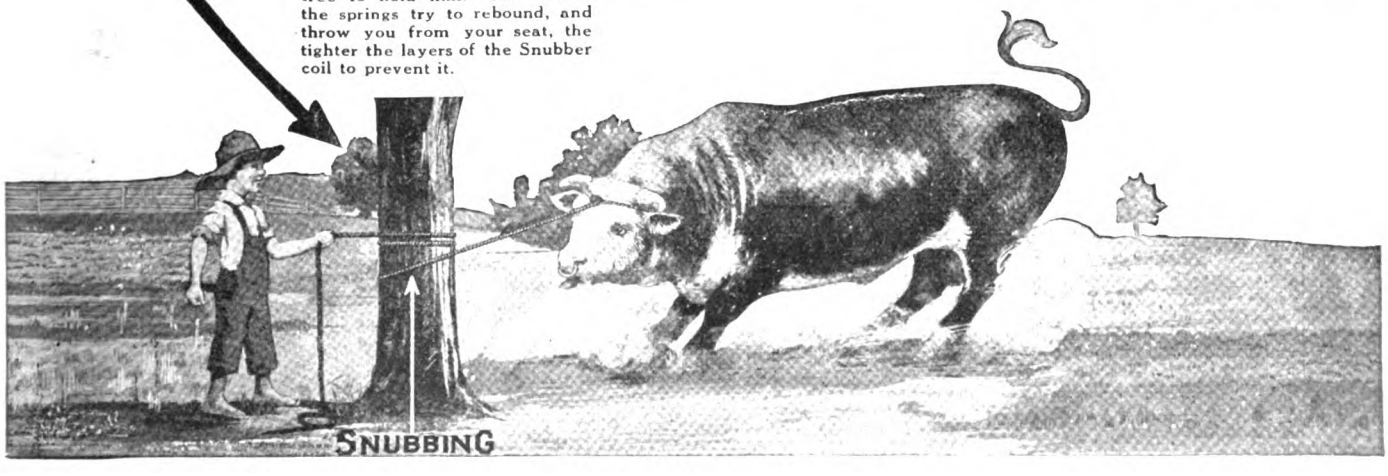
Follow the example of America's foremost car builders; equip with Snubbers; put an end to abrupt or excessive rebound of the Springs, and you will—

1. Make your car ride remarkably easy and quiet on all roads,
2. Save on tires and springs, by keeping wheels from bouncing
3. Reduce your expense for up-keep and mechanical repairs, and
4. Add a year or two to your car's usefulness.

Let us send you literature, name of nearest dealer and list of standard equipments.

GABRIEL MFG. CO., 1411 East 40th Street, CLEVELAND, OHIO

The harder the Bull pulls, the tighter the rope coils around the tree to hold him. The harder the springs try to rebound, and throw you from your seat, the tighter the layers of the Snubber coil to prevent it.



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CURTIS ST-LOUIS

FREE
CURTIS-AIR
FREE FROM OIL



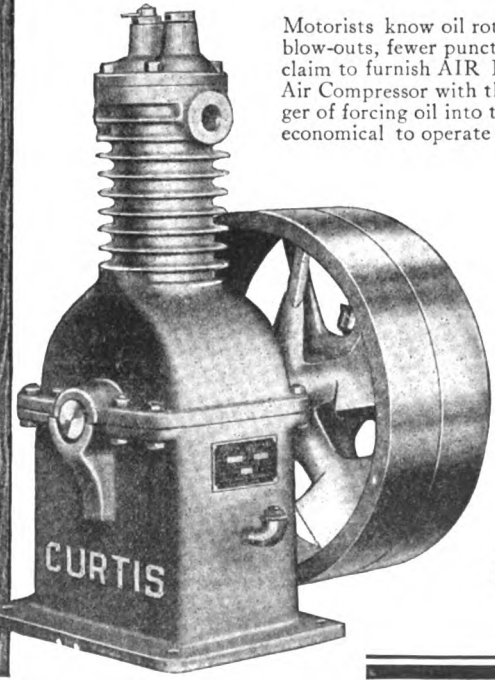
This Sign

carries a slogan known to motorists the country over. It brings them in.

10 x 14 inches—baked enamel on steel—cannot be bought, but furnished FREE with CURTIS Garage Air Compressors—and can be secured in no other way.

It's a sign of progress—a sign of efficiency—a sign that you are prepared to supply CURTIS AIR—FREE FROM OIL—the kind of Free Air Service the public demands. Get an edge on YOUR competitors—

Install a Curtis Compressor



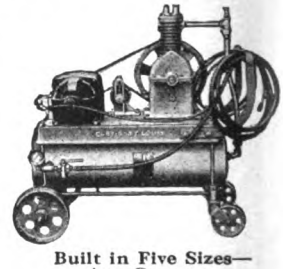
Motorists know oil rots tires—and that AIR FREE FROM OIL means less blow-outs, fewer punctures, greater tire mileage and less repairs. While others claim to furnish AIR FREE FROM OIL, the CURTIS is the ONLY Garage Air Compressor with the controlled splash oil system, which eliminates all danger of forcing oil into the air line. Reliable, requires practically no attention, economical to operate and guaranteed to stand up under the severest strains.

Exclusive Curtis Features:

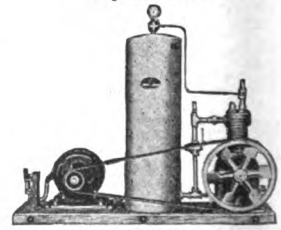
Patented controlled splash oil system.
Less oil required. No grease nor oil cups.
Fully enclosed, dust-proof, self-oiling.
Hand unloader permits starting against pressure.
Large fan flywheel keeps compressor cool.
High and low level oil filling gauge.
Valves can't drop into cylinder and wreck machine.
Bearings renewable, adjustable, non-cutting.
Two bearings—crank shaft not overhung.
Fewer parts—reducing maintenance cost.
Easiest to install—no special base required.

5 Sizes—Stationary or Portable

There is a Curtis Compressor to meet the requirements of your business. It will pay you to investigate. Ask your jobber—or write us for particulars and prices.



Built in Five Sizes—Any Current.



Built in Five Sizes—Any Current.

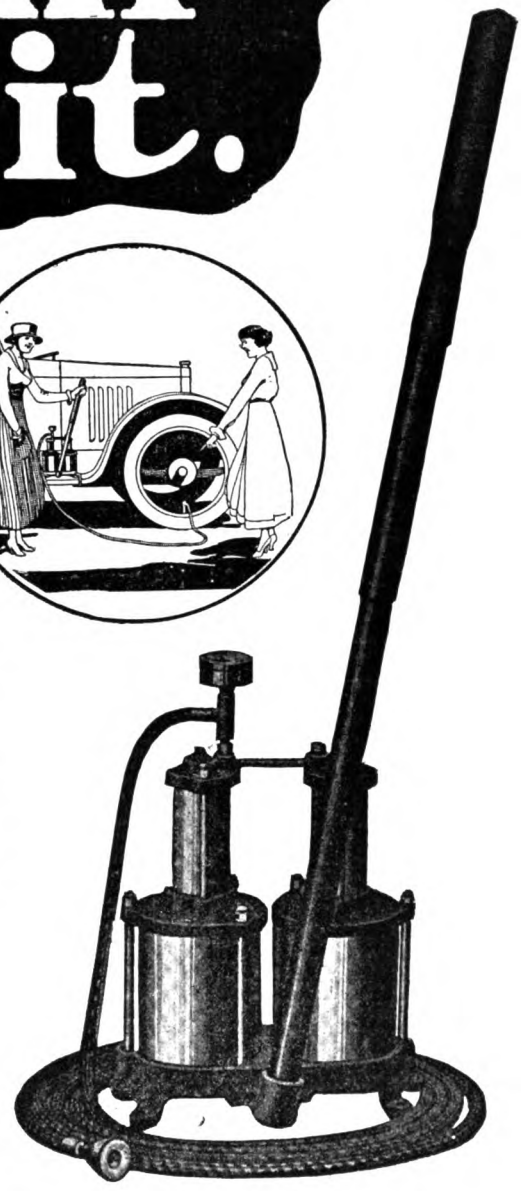
CURTIS PNEUMATIC MACHINERY CO.
1530 Kienlen Ave., St. Louis, Mo.
Branch Office—530-E Hudson Terminal, New York City

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At Our Risk- You Can Prove it.

DON'T waste good money on tire pumps that either break your back, or pump **Rubber Rotting** oil particles or gasoline fumes into your tires.





TAKE NO CHANCES

At our risk you can prove that the **"Dead Easy"** is quicker, safer, easier and cheaper than any other tire pump, either engine drive or hand power.

Convenient to carry with any car, it is always ready for instant service. The gauge showing exact tire pressure, there is no guesswork—and it's **"Dead Easy."**

FREE TRIAL OFFER

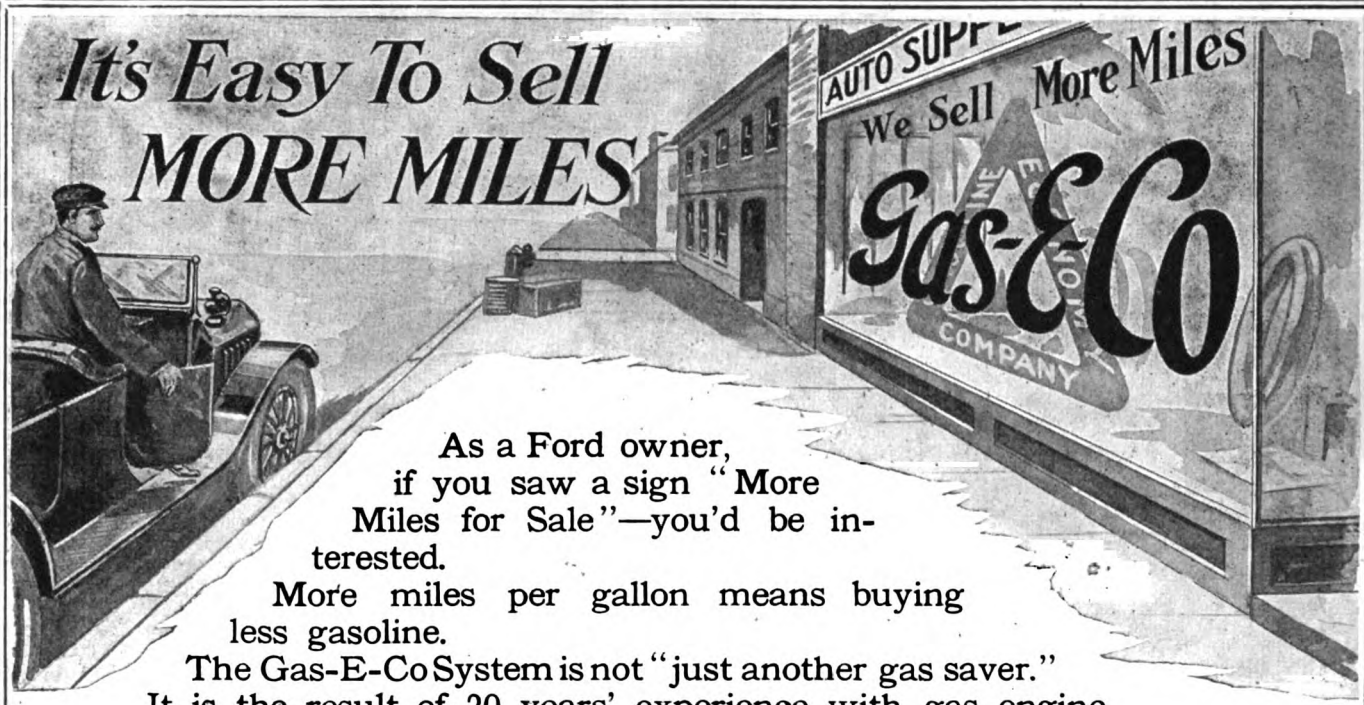
Write Today, NOW, for Fifteen-Day—No-Money-in-Advance—Free Trial Offer

GLOBE MANUFACTURING COMPANY

Battle Creek, Michigan, U. S. A.

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It's Easy To Sell MORE MILES



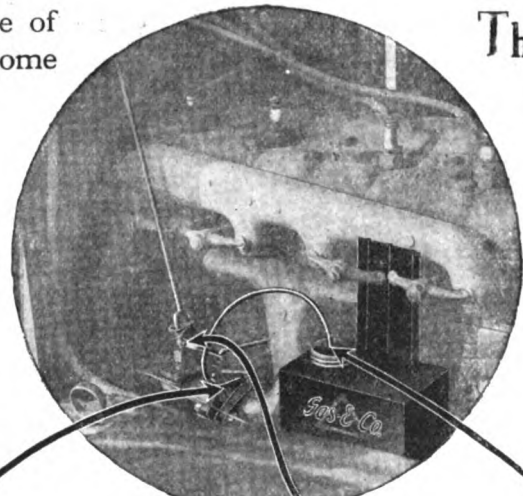
As a Ford owner, if you saw a sign "More Miles for Sale"—you'd be interested.

More miles per gallon means buying less gasoline.

The Gas-E-Co System is not "just another gas saver." It is the result of 20 years' experience with gas engine construction.

It will give an average of 30% increase in mileage (some users testify to 80%). It develops greater power and more flexibility in the engine, both in high gear and low gear, on hills and levels. It positively eliminates carbon, and keeps it away.

Twenty minutes to install it; no holes, no cutting. Satisfaction on 10 days' trial or money refunded.



COMFORT

1. THE NEEDLE VALVE CONTROL automatically reduces the consumption of gasoline in proportion to the demands on the engine and insures smooth running.

POWER

2. THE VAPORIZER is an auxiliary mixing chamber which automatically maintains the maximum efficiency of the gas at all engine speeds.

RELIABILITY

3. THE DECARBONIZER automatically supplies the engine with the moisture necessary to produce the maximum of power and to totally eliminate carbon.

The Gas-E-Co System For Ford Cars, $10

Shipped by Parcel Post on Receipt of Price

DEALERS

Order a Gas-E-Co System today, put it on your Ford demonstration car — prove it every way yourself. A big business getter because it makes satisfied customers. Profitable offer to those garage owners and dealers who are "keen" after business.

GASOLINE ECONOMY COMPANY, *Sole Owners and Manufacturers of the Gas-E-Co System* **1103 Colonial Trust Bldg., Philadelphia, Pa.**

The Gas-E-Co System is NOT just a bright idea. It is "RIGHT" and is here to stay.

Gas-E-Co COMPANY

Write today for free Book on Gas Economy. It shows we know our business. Books furnished to Gas-E-Co dealers for distribution.

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Stop that grease leak!



What every Ford owner wants

You know that grease leaking from the rear axle housing of a Ford, costs the owner money, rots his tires and makes an unsightly mess on the wheel. This grease leak can be stopped effectively with Shurnuff Grease Retainers.

Not an ordinary felt washer which soon needs replacing, but a patented retainer consisting of 3 extra high grade felt washers, 1 rubber asbestos washer, steel cup and retaining rings. When assembled as shown in cut, it is the most effective and lasting way of stopping grease leaks.

A pair costs only 90c. retail. (In Canada, $1.35.)
Ford owners who see them will buy them.

The price is so low and the work they do so important, that you can sell every Ford owner in your section who knows that you have them to sell. Each set is packed in an attractive carton for counter display, and a dozen sets make up a dealer's size case. Order a dozen from your jobber today and find out how fast they sell.

All Shurnuff Ford necessities are sure enough fast sellers. All guaranteed. All packed in attractive cartons for shelf-display. Carried by jobbers everywhere. Write us for special information.

Other Shurnuff Sellers:



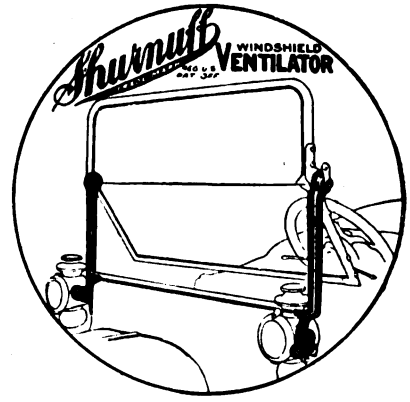
Stops sagging of running board, eliminates excessive vibration of front fender, reduces shocks and stabilizes the car. Needed on all Fords. Saves battery from damaging vibration.

Price per pair	$4.50
West of Rockies	4.75
In Canada	6.75



Combines intake and exhaust so that heat from latter dries incoming gasoline and vaporizes it perfectly. Result: smoother running, more power, more miles per gallon, less carbon.

Price	$9.00
West of Rockies	10.00
In Canada	12.50



Gives a Ford all the ventilating features and dust and rain protection of the high priced car. Rainproof at sides, top and bottom. Quickly and easily installed.

Price	$7.50
West of Rockies	7.75
In Canada	11.25

Shurnuff Mfg. Co. Dept. D St. Louis, Mo.

Please Mention the Automobile Dealer and Repairer when writing to advertisers.

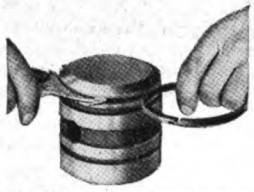
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MUNGER "Always Tight" Piston Rings



Ready to insert the Munger Re-grooving Tool to true-up a worn piston groove



The Munger Re-grooving Tool in position for cutting. Testing width of groove with an overwidth ring



Showing how easily Munger "Always Tight" Piston Rings can be placed in the piston grooves with the Munger Ring Insertion Tool

A simple one-piece ring that remains *permanently* gas-tight!
A ring so easy to install that anyone can slip it over the Munger Ring Insertion Tool without breakage or trouble of any kind.
A ring that will give you increased power, greater speed, smoother running, a lower gasoline consumption and an unusual freedom from excess carbon.
By a patent process of peening the Munger "Always Tight" Piston Ring is made to conform to the shape of the cylinder. The Munger "Always Tight" Expansion Joint keeps it compression-tight until completely worn out.
Each outfit of Munger "Always Tight" Piston Rings includes one *overwidth* ring for each piston, to be used in grooves that have become worn. Also a Re-grooving Tool, with which worn grooves can be straightened and trued-up quickly and accurately without even disconnecting the piston from the connecting rod. This avoids expensive lathe work and effects a saving that every car owner and repair man will appreciate.

SPLITDORF ELECTRICAL CO., Newark, New Jersey

Splitdorf Branch Houses and Service Stations:

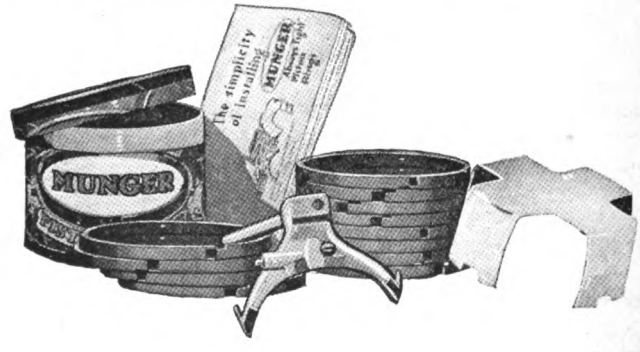
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The MUNGER "Always Tight" expansion joint

Accessory Dealers and Garage Men!

Any jobber will supply you with Munger "Always Tight" Piston Rings. Order them now!
List price for all sizes up to 3¾ in. diameter, $1.25 per ring.
With each complete outfit of rings, a *Munger Piston Re-grooving Tool* and a *Munger Ring Insertion Tool* are supplied without extra charge.



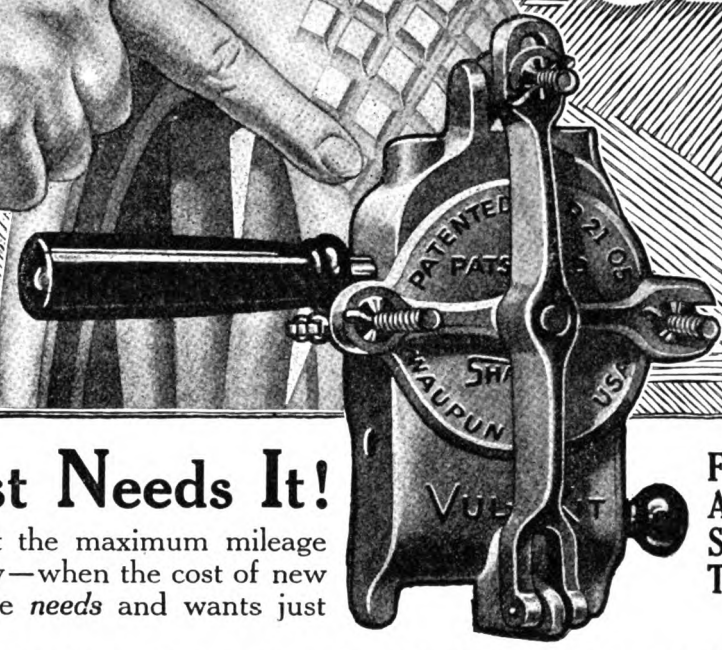
The MUNGER "ALWAYS TIGHT" PISTON RING OUTFIT—

8 "Always Tight" Rings (Regular Size)
4 "Always Tight" Rings (Overwidth)
1 Regrooving Tool
1 Ring Insertion Tool

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SHALER Vul-Kit

$3.50



Repairs Casings and Tubes

Every Motorist Needs It!

Every motorist wants to get the maximum mileage from his tires. Now especially—when the cost of new tires is tremendously high—he *needs* and wants just this kind of a tire saver!

For Any Size Tire

The SHALER Vul-Kit fits any size tire—casing or tube. It mends the holes and cuts in the casing that tend to rot the fabric and cause blowouts. Will repair any puncture, tear or cut in the tube. It is simple and easy to operate—anyone can get perfect results without previous experience.

Make Money Selling This Popular Outfit

No new car is supplied with a tire saving device—every car owner should have a SHALER Vul-Kit in his tool box. It is easy to sell—our advertising acquaints motorists everywhere with the SHALER Vul-Kit and they call for it by name. Just let them know that you sell it—and they'll quickly step in and buy it. Every Vul-Kit you sell leaves you a good profit—besides it gives you a continuous profit on the resale of repair material and supplies which the motorist must have—and it brings car owners to your place, who also buy other goods!

Every Jobber Sells It—Ask Yours

Motorists in your vicinity will insist on having the SHALER Vul-Kit. Don't let your competitor make these profits that should come to you. Write your jobber today for prices and dealer selling helps—or order a supply of Vul-Kits NOW so that you can begin making these big extra profits at once.

Catalog of Complete Line of SHALER Vulcanizers for Garages, Repair Shops and Motorists Mailed FREE on Request.

C. A. Shaler Company, 805 Fourth Street, Waupun, Wisconsin

Oldest and Largest Manufacturers of Vulcanizers

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Here is the Sign of Bearings Service

It now appears in over 500 cities in the United States and Canada.

When you need repairs or replacements on Timken, Hyatt or New Departure Bearings go direct to the Bearings Service Company Distributor.

This sign is your guide.

It is the visible evidence by which you can identify an authorized distributor of the Bearings Service Company.

It assures you prompt, efficient service on the three leading makes of anti-friction bearings—Timken—Hyatt—New Departure.

Direct Branches

New York
Detroit
Chicago
Boston
San Francisco
Los Angeles
Atlanta
Seattle
Minneapolis
Kansas City
Dallas
Cleveland
Denver
Indianapolis
Rochester
Philadelphia
St. Louis
New Orleans
Omaha
Pittsburgh
Portland, Ore.
Toronto, Can.

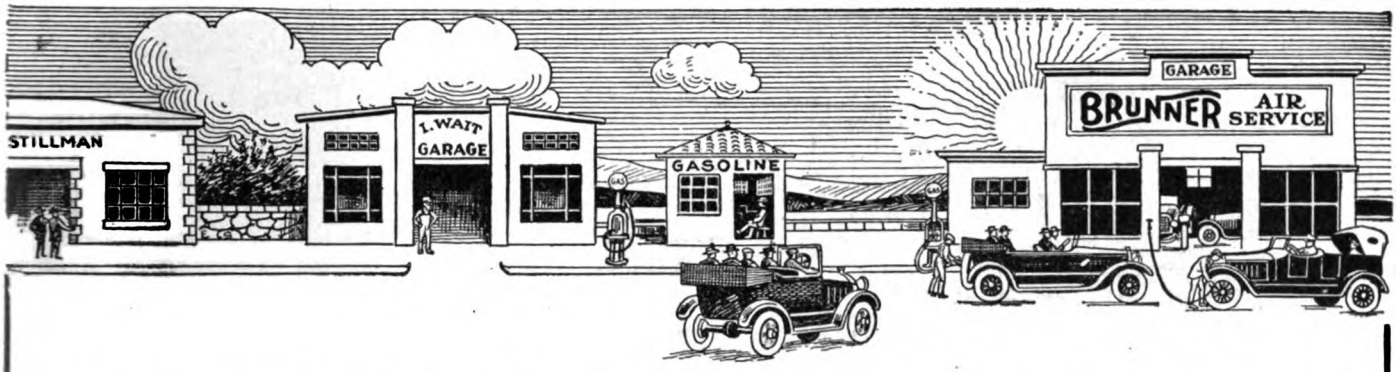
Authorized Distributors in Over 500 Cities

Authorized National Service

BEARINGS SERVICE COMPANY

General Offices: Detroit, Michigan

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WE USE A BRUNNER AIR COMPRESSOR
FREE AIR
FOR YOUR CONVENIENCE

MR. GARAGEMAN, IF YOU HAVE A BRUNNER AIR COMPRESSOR AND ARE NOT DISPLAYING A BRUNNER SIGN ON YOUR GARAGE TO ADVERTISE THE FACT THAT YOU ARE RENDERING BRUNNER SERVICE, YOU SHOULD SEND FOR A BRUNNER SIGN WITHOUT DELAY.

ADVERTISE YOUR BRUNNER SERVICE AND SECURE YOUR FULL MEASURE OF THE BRUNNERWISE MOTORISTS' PATRONAGE.

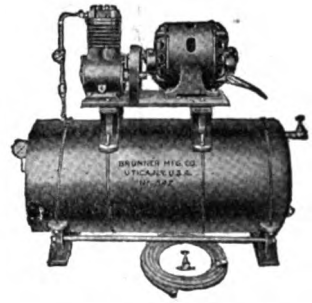


"The Motorist who is Brunnerwise knows Brunner Service Satisfies"



Thousands of garagemen have been advertising Brunner Service by means of the Brunner Sign for many years, and Brunner Service has been consistently demonstrating its absolute dependability to thousands of wise motorists for many years, so that these Brunnerwise Motorists always recognize the Brunner Sign as a sure sign of thoroughly efficient and dependable compressed air service wherever they see it.

In this way the great advertising value of the Brunner Sign has been convincingly demonstrated to the garageman in actual service for many years, and the thorough reliability of Brunner Service has been demonstrated to the motorist.



NO GARAGEMAN WITHOUT A BRUNNER AIR COMPRESSOR CAN AFFORD TO OVERLOOK THE SPLENDID OPPORTUNITY OF SECURING THE PATRONAGE OF THE BRUNNERWISE MOTORIST—A BRUNNER AIR COMPRESSOR WILL DO IT.

WHEN YOU BUY A BRUNNER AIR COMPRESSOR

you buy a high grade, practical machine designed and developed for the garageman's use, built in the largest, best equipped exclusive garage air compressor plant in the world, and backed by a responsible organization whose entire time and attention has always been exclusively devoted to the garageman's interests. No attachments necessary to help motor start compressor against full load—No cages necessary to keep valves from falling into cylinder-- No restriction of lubrication to invite trouble—No claims of impossible performances, but—simply the good substantial business proposition it has always been for the garageman.

Write for No. 15 Catalog and name of Brunner Jobber covering your town.

BRUNNER MANUFACTURING COMPANY

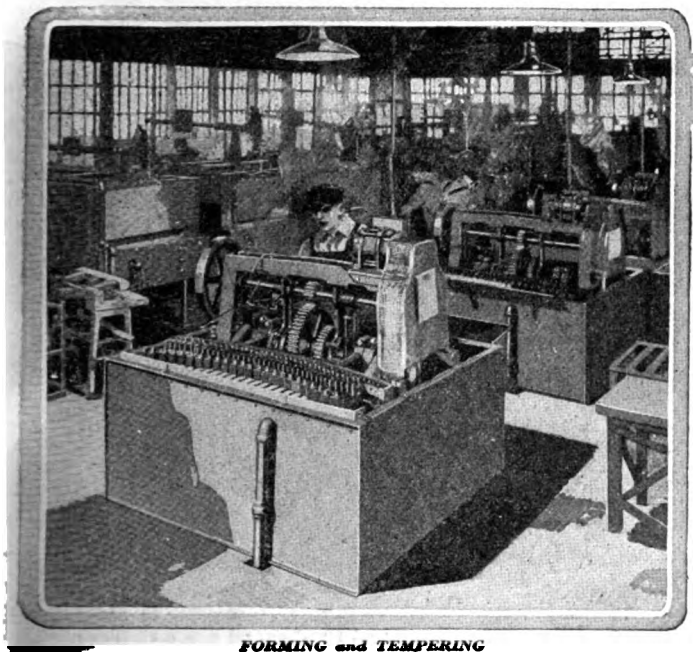
General Offices and Plant:
UTICA, N. Y.

Cincinnati Branch:
Cincinnati, Ohio.

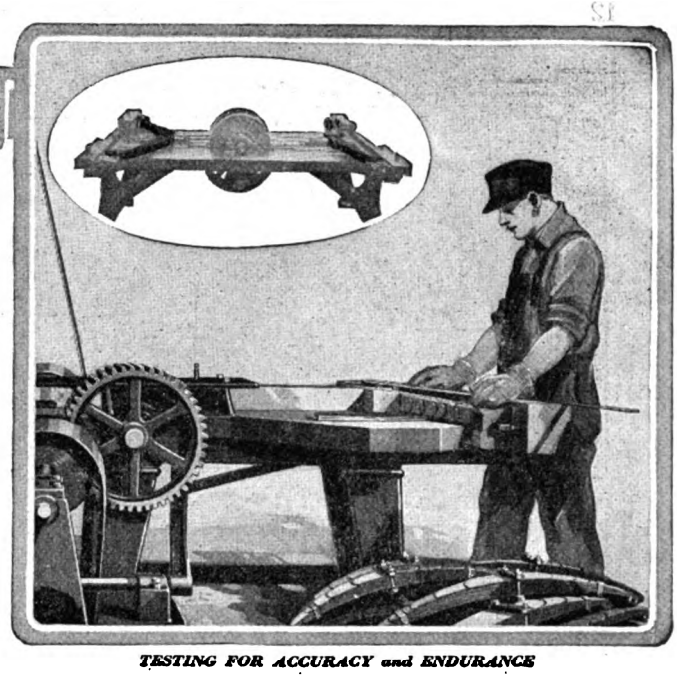
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FORMING and TEMPERING



TESTING FOR ACCURACY and ENDURANCE

Resiliency·Endurance·Accuracy

A REPLACEMENT SPRING, to be worth its price must combine three things: Resiliency, Endurance and Accuracy. And of these three Accuracy is the most essential.

A spring must "fit like a glove" if it is to be resilient and durable. It must "fit like a glove" if it is to give satisfactory service.

Your business as a repair man depends on your ability to give satisfaction to customers. Our business depends on your success and patronage.

Knowing this, we have built our business on one policy: Satisfaction to Car Owners—Satisfaction and Profit to Dealers.

The Harvey Process is but a part of the Harvey Policy. Harvey Springs are scientifically made from the best spring steel obtainable. They are so carefully made and so thoroughly tested in design, material and workmanship that Resiliency, Endurance and Accuracy are absolutely assured.

If you are not already selling the Harvey Springs you should get in touch with us at once. It means satisfaction to your customers and profit to you.

There's a Harvey Jobber near you. Drop us a card and we will send you his name and our Spring Book containing specifications etc. of over 900 kinds of springs. Write today, you may need Harvey Help tomorrow.

Harvey Spring & Forging Co.

921 17th St. **Racine, Wis.**

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DU PONT AMERICAN INDUSTRIES



The Auto Specialty That Sells Itself

100% efficiency is solving one of the most vexing problems of motoring.

Pontoklene removes tar like magic! Makes tar melt and run like the proverbial snowball in a real hot place. Is also a perfect grease and oil remover—restoring the original polish of a car without rubbing. Much better than gasoline for cleaning engines.

Successfully established wherever introduced by distribution of samples. Every sample makes a buyer.

Garages supply it to their car washers because it saves hours of time and insures clean work.

The empty can makes a fine reserve oil carrier.

Prices:—1/4 Gallon, $1.00—1/2 Gallon, $1.50

Quantity Discounts to the Trade.

Delivered free upon receipt of price if no dealer in your city can supply you.

Special Proposition to Dealers and Distributors.

Get Pontoklene in stock quick—before the road-tar season starts. We will help you introduce it. After that it sells itself. Write us today.

Mark X before subject that interests you and Mail This Coupon to

E. I. DU PONT DE NEMOURS & CO.
ADVERTISING DIVISION
W LMINGTON A. D. R. DELAWARE

	Pontoklene		Motor Fabrikoid
	Blasting Powder		Craftsman Fabrikoid
	Farm Explosives		Truck Special Fabrikoid
	Hunting		Marine Special (U. S. Stand.)
	Trapshooting		Fabrikoid Sheeting
	Py-ra-lin Toilet Goods		Fairfield Rubber Cloth
	Challenge Collars		Anesthesia Ether
	Py-ra-lin Rods & Tubes		Leather Solutions
	Py-ra-lin Pipe Bits		Metal Lacquers
	Py-ra-lin Specialties		Wood Lacquers
	Sanitary Wall Finish		Mantel Dips
	Town & Country Paint		Bronzing Liquids
	Vitrolac Varnish		Pyroxylin Solvents
	Vitrolac Stain Varnish		Commercial Acids
	Flowkote Enamel		Alums
	Antoxide Iron Paint		Saltpetre
	Shingle Stain		Wood Pulp
	Auto Enamel		Pigment Bases
	Rayntite Top Material		Tar Distillates

Name _____

Address _____

City _____ State _____

Du Pont Chemical Works

Owned and Operated by

E. I. du Pont de Nemours & Company

Equitable Bldg. New York

VISIT THE DU PONT PRODUCTS STORE
1105 Boardwalk Atlantic City

The du Pont American Industries are:

E. I. du Pont de Nemours & Company, Wilmington, Delaware. . . Explosives
Du Pont Chemical Works, Equitable Bldg., N.Y. Pyroxylin & Coal Tar Chemicals
Du Pont Fabrikoid Company, Wilmington, Delaware. . . Leather Substitutes
The Arlington Works, 725 Broadway, N. Y. . Ivory Pyralin and Cleanable Collars
Harrison Works, Philadelphia, Pa. . . Paints, Pigments, Acids and Chemicals
Du Pont Dye Works, Wilmington, Delaware. . . . . Dyes and Dye Bases

DU PONT

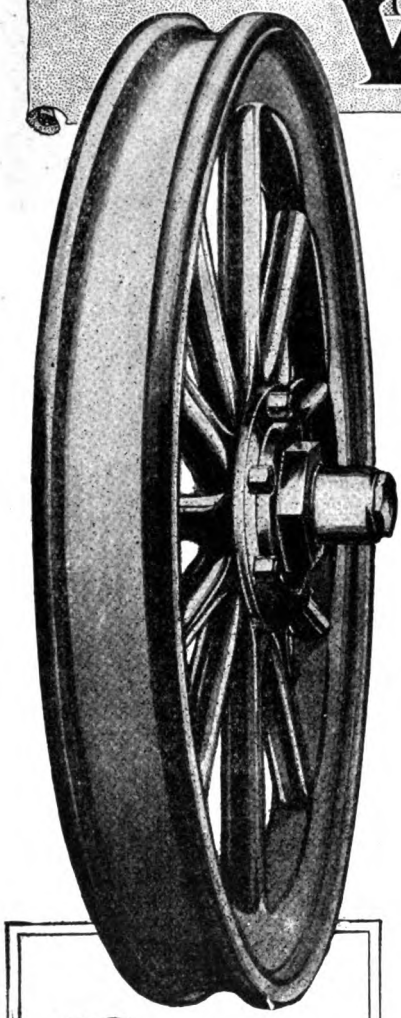
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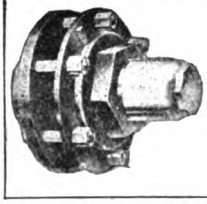
For FORD CARS

MINUTE WHEEL

H-S

DEMOUNTABLE





Equipment Extra Wheel and Flange, 4 Special Hubs and Wrench.

It's the fastest selling, most profitable Ford accessory on the market because the need for it is greatest.

A Tire Changed in 60 Seconds

After two years on the market the success of the Minute Demountable Wheel is now firmly established. It's an all year 'round seller — needed as much in the Winter as Summer. Its wonderful convenience is what sells it. Those who install it delight to demonstrate it to their friends.

Backed by strong national advertising in Saturday Evening Post, Literary Digest, Collier's, Metropolitan, Munsey's, Country Gentleman, Christian Herald, Cosmopolitan, Sunset and other big mediums.

Write us for literature, prices and discounts, to Dept. K.

Retail Price, complete $30.00
Denver and the West $35.00

H-S REPAIR PARTS H-S

The extra quality of **H-S** repair parts for the Ford and Overland cars is more and more being impressed on owners' minds. They know repairs made with **H-S** parts stay repaired. You will do well to build your business in repairs on quality of parts. You will find our prices average no higher than the parts bearing no trademark.

Write for repair price list and catalogue, Dept. K.

Licensed under patents of Wire Wheel Corporation of America

HIGHEST QUALITY H-S PROMPT SERVICE

This trademark guarantees to you quality in material and workmanship — perfect fitting parts

HILL-SMITH METAL GOODS COMPANY

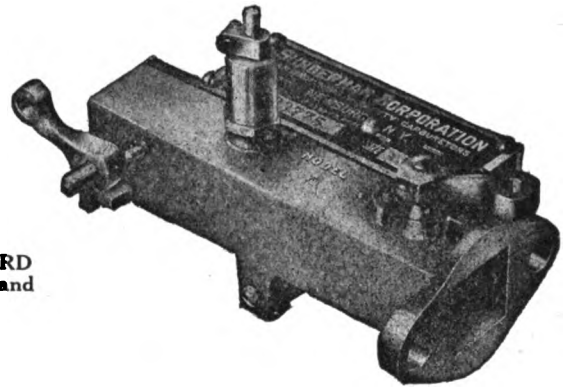
MANUFACTURERS OF MOTOR PARTS AND ACCESSORIES

REPAIR PARTS FOR THE FORD AND OVERLAND CARS

BOSTON MASS.

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Saves its Cost in a Week of Summer Driving—and Gives More POWER and SPEED at the Same Time



Model F

$6 For FORD METZ and SAXON FOUP

F. O. B. Newburgh

SUNDERMAN
Vacuum Carburetor

THE supremacy of the Sunderman Carburetor springs from its two simple scientific principles — extra fine break-up of the gasoline particles and the use of multiple jets. The method by which these two principles are combined is the Sunderman idea — and that idea, bringing about perfect carburetion, has brought commercial success.

The Sunderman principle of carburetion is universal—it applies to all makes of cars and styles of engine — passenger car, truck, motor-boat, tractor, stationary and airplane.

It Has Been a Blessing to Ford Owners

It has done wonders for owners of Ford cars. First, it has delivered to them an unexampled, surprising economy. Second, it has furnished more power than Ford owners believed their engines possessed, and it has given their engines a range, a flexibility that has been the chief talking point for the bigger, many-cylindered cars.

ECONOMY — A saving of from 30 to 50% in gasoline consumption follows the installation of a Sunderman on a Ford car. This is not a *claim* — it is a demonstrated fact in many thousands of cases. We have the proofs — which we shall gladly produce at any time.

This saving comes from the more efficient combustion of the gasoline charge, due to the finer vaporization of the fuel particles produced by the Sunderman mixing principle. The finer the particles the more rapid the explosion and the more complete the combustion. The more complete the combustion the greater the power secured from a given amount of gasoline in the charge.

Since a given requirement of power can be produced from a smaller amount of gasoline, it follows unalterably that a saving must result. This saving we conservatively place at 30% to 50%.

POWER — Given its accustomed quantity of gasoline, your Ford (or any car on which the proper model of Sunderman Carburetor is installed) will give a snappy burst of power, an assurance of a power reserve that is a comfort on a hill or in any bad pull.

That confidence in a motor's power reserve is what an owner pays extra thousands for when he buys a car. You can have it in a Ford—equipped with a Sunderman.

FLEXIBILITY — To get out of a crowd quickly — to run from low to high speed with an eager response from your motor — to idle economically, to keep going at a crawling speed in the tangle of traffic — to pick up mightily, competently, resistlessly under a hard pull, a long climb or a heavy load — that spells flexibility, the blue-ribbon quality that has been sought by engine designers since the beginnings of the automobile. An engineer's greatest work is accomplished when he produces a powerful, *flexible* engine. You can have that thrill with a Ford — when it's equipped with a Sunderman.

BUY IT NOW—Don't deny yourself the comfort, convenience and economy that come with the use of a Sunderman Vacuum Carburetor. Put one on your car *now*—don't wait. There's no need. You can install it yourself — easily, according to the simple, positive printed instructions we furnish with every carburetor. It is easy to adjust to your motor. Once properly adjusted, you simply need let it alone — it will work for you and give you a new joy in driving your car. But do it now—it's useless to *want* unless you're willing to *act*. Write us *now*.

Dealers—We want you—we don't want to do business without you. We give you excellent co-operation, splendid advertising support and a good proposition. Ask us for it now.

SUNDERMAN CORPORATION

13 Chambers Street **Newburgh, N. Y.**

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Price $2.50
F. O. B. Newburgh

To install, simply take off old manifold, replace with the Sunderman manifold, use same bolts, etc., and your job is done.

This special aluminum alloy manifold is equipped with two special features that recommend it to any Ford owner who wants more power or speed, with quicker starting and economy in gasoline consumption.

Gives More Power, Because—

Notice the "bend" in the top center of the manifold illustrated. The ordinary manifold for Fords does not possess that patented feature, and consequently the gasoline being drawn into the motor loses velocity at this point—thus hampering the motor's efficiency.

This "bend" permits the maintenance of a uniform velocity in the flow of gasoline, literally "parting the waves" and thus supplying the motor with gasoline as its needs demand. This in itself is a feature which adds much to both power and speed, and therefore enables the Ford to function with greater efficiency.

Another feature is an interior pocket in the elbow of the manifold, where it turns to meet the carburetor. All gasoline that condenses in the manifold when the motor slows down or stops suddenly is caught in this little pocket or shallow basin, and is ready always to give quick starting—that little extra "snap" and "pep" that mean a fast getaway.

In the ordinary manifold this condensation flows back and puddles in the carburetor, to the detriment of starting and causing frequent choking from a too rich mixture.

"It's in the Bend"

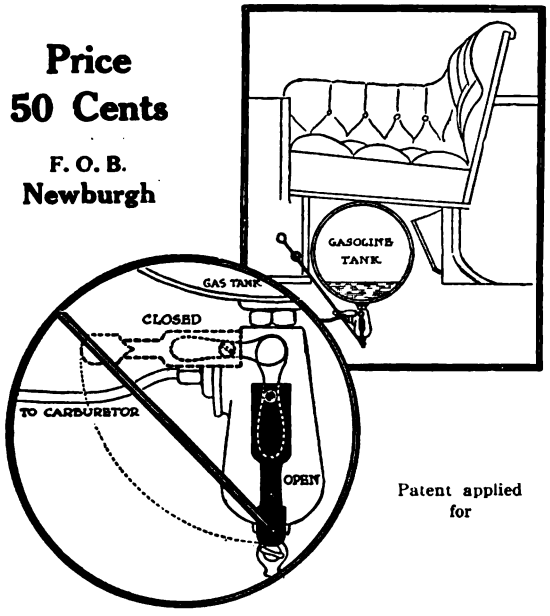
Notice these two features again—the "bend" gives uniform velocity, an absolute essential that is absent from the ordinary manifold. The interior pocket acts as a catch basin for condensed gasoline and enables quick starting.

You need both features—you want the extra power and economy—you get them all in this splendidly designed and manufactured aluminum manifold.

SUNDERMAN

Gasoline Shut-Off for Fords

Price 50 Cents
F. O. B. Newburgh



Patent applied for

A Pull or a Push Does the Work
And it's yours complete for half a dollar

Buy it now—and let this simple but necessary device be ready on your car the next time you need it.

Suppose you want to shut off the gasoline line of your Ford? Ever think of the job it would be? Lift up the floor boards, get your clothes and your hands all messed and dirty—turn off the gasoline petcock, replace the floor board; and then when you want to turn the gasoline on again, go through the same dirty operation. Or perhaps you'd rather get under the car, lie on your back, turn off the gasoline, get out from under, do your job on motor, finish it, and then crawl under again to turn on the gasoline.

The Sunderman Gasoline Shut-Off for Fords does away with all that

Simply bore a hole in the floor board—lift it once only—slip the shut-off device over the handle of the gasoline petcock, tighten the side screw with a twist of your fingers, attach shut-off handle to shut-off with cotter pin, slip it through the floor board—and then forget it forever.

You'll nevermore have to "get out and get under" when you want to shut off your gasoline—for whatever reason, whether you want to stop a leak, drain your carburetor or choke off the nasty flame from a backfire.

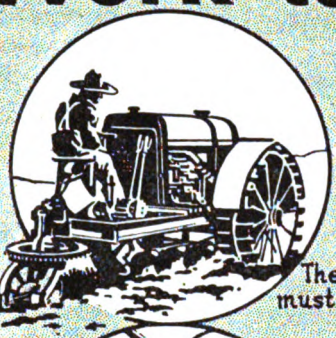
All you need do is pull the handle of the Sunderman Gasoline Shut-Off—and it's done! And when you want to turn on the gasoline flow again, simply push it back. It works simply, surely—always.

SUNDERMAN CORPORATION

13 Chambers Street **Newburgh, N. Y.**

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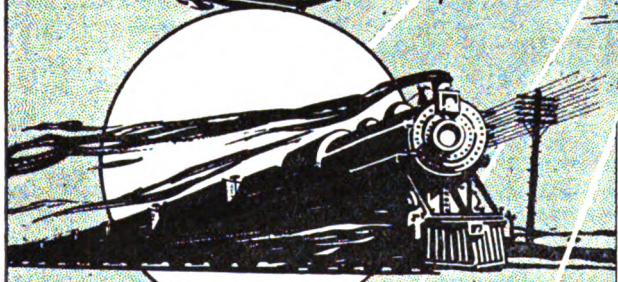
Work together for victory.



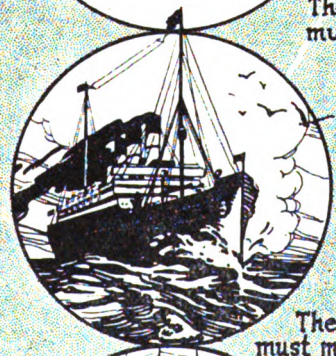
The Farmer must raise more.



The Mechanic must produce more.



The Railroads must speed up.



The Ships must make more trips.



The Business Man must help the others.



On Washington's Birthday I watched the New York City detachment of our new National Army swing down Fifth Avenue. There were ten thousand of them marching through the heavy, swirling snow.

The even lines of olive drab figures, the bright, fresh young faces, the quivering flags came out more rugged and businesslike in the storm than they would have in the sunshine. The weather chipped in to show everybody that this was an army trained for a big and serious job.

I wondered how many more would have to go. We may have to send all the young men and then call for the older men, just as France has done, and just as we did during the Civil War. None of us want that to happen.

The only way to stop the outflow of soldiers is to beat the Kaiser and his horde of Huns. The only way to do that is to give our boys in the trenches so much of the munitions of war—of such excellent quality—that they will be as superior to the enemy as a workman with a turret lathe is to a workman with an old hand lathe.

So let us think quickly of better ways to do our work. Scarcity of labor has made the American people a nation of inventors. For war alone we invented the torpedo, the wireless torpedo, the submarine, the ironclad, the repeating rifle, the machine gun, the revolver, the magazine pistol, the aeroplane, and the high-power cannon.

The war today demands that we do more than we ever have done before. Let us all speed up, with the thought that we, too, are fighting the enemy, even if we can't see him. Let us hurry our work at our desks and benches, and thus keep millions of men out of the trenches.

(Signed) John H. Patterson

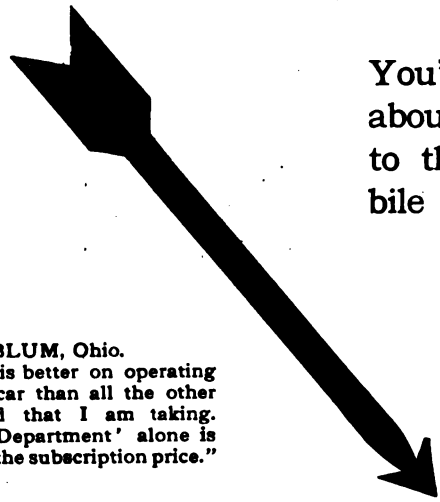
President

The National Cash Register Company.

If one slows down all are delayed.

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Why do you allow every Tom, Dick and Harry to tell you how to "fix it"?



You'll get all the information you want about repairing automobiles if you'll turn to the "Trouble Dept." in the Automobile Dealer and Repairer.

FIND OUT FOR YOURSELF!

From FRANK BLUM, Ohio.
"Your paper is better on operating and repairing a car than all the other papers combined that I am taking. Your 'Trouble Department' alone is worth more than the subscription price."

From E. E. CLARK, North Carolina.
"I have had your magazine for a year and will not do without it as long as I can get it. I always look at the 'Trouble Department' the first thing. If a man has an automobile he can afford to pay ten dollars a year for the information he will get out of your magazine, if he cannot get it for less."

From F. A. BURGER, California.
"It (Automobile Dealer and Repairer) certainly contains more valuable information for the general repairman than any other motor car journal I have ever read, and I surely subscribe to a 'flock' of them."

Cut Out This Coupon and Mail it to

Motor Vehicle Publishing Company
71-73 Murray Street New York City

SPECIAL COUPON
3 Months Free Trial Offer

Please send me copies of the Automobile Dealer and Repairer for three consecutive months and it is understood that these will be mailed to my address absolutely free and without any obligation on my part.

Name .....

City or Town .....

Street and No. or Post Office Box .....

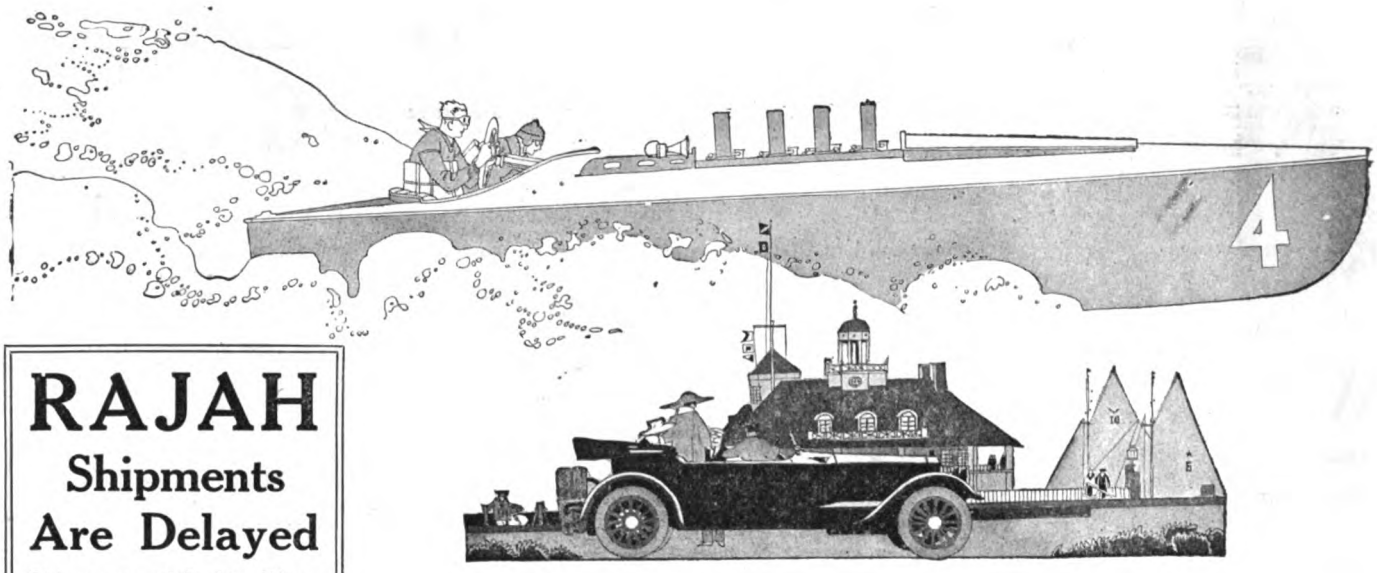
County .....

State .....

This coupon not good for subscribers.
Will not be accepted for the extension of subscriptions now in force.

If you are already a subscriber to our magazine, please see that the coupon on this page is used for one of your friends.

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RAJAH

Shipments Are Delayed

Shipments of Rajah Plugs are considerably delayed owing to heavy government requirements placed with the Rajah factory.

In some sections of the country Rajah-Plugs are almost unobtainable. *Don't let this happen to you.*

We strongly urge you to place your orders now, anticipating your requirements as far ahead as possible to insure your having stock on hand.

Rajah Terminals and Adapters
are furnished so that Rajah Plugs can be used with any car.



Rajah Regular and Ferrule Clip Terminals
Adjustable to any cable and with ferrule to fit any cable. With the extra collar supplied both can be used with any make of plug.



Rajah Thumb Nut and Stud Terminals
The Thumb nut is an adapter for Dodge, Ford, Hup, Hudson, Maxwell, Mitchell, Packard Twin Six and Pullman. The Stud for Buick, Chevrolet and Oldsmobile.



Rajah Ball Terminal
Adapter for Franklin, Locomobile and Willys-Knight.

Manufactured by
Rajah Auto Supply Co.
Bloomfield, N. J.
Sales Department
Edward A. Cassidy Co.
280 Madison Ave., New York

The plug that puts power behind the pistons

In speed boats, racing cars and airplanes, Rajah Plugs unfailingly deliver the quick, hot spark that turns gasoline into power.

Records of racing, hill-climbing and flying events, past and present, are indisputable proof of Rajah supremacy.

The automobile owner, who wishes to have available in his car the last ounce of power and be forever free from ignition troubles, should need no stronger endorsement than this.

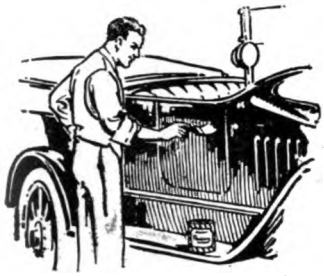
The reputation of the Rajah is rapidly spreading through our national advertising and through the recommendations of satisfied users. Take advantage of this Rajah demand. It means quick and easy sales.



NOTE—Sell a complete set of Rajah Plugs to every customer. The delightful sense of quick response, increased power and absolute dependability will add to their satisfaction and hold their trade.

RAJAH
SPARK PLUGS

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Quick to dry and easy to apply. Any car owner can do it.

FOR DULL LOOKING SHODDY CARS!



WHEN the finish of a car becomes dull or shoddy looking, **it doesn't always follow that the car requires an expensive repainting job.**

Nine times out of ten all it needs is a refinishing coat of Panvar.

Panvar is a **transparent,** enameling lacque that gives to any color car a lasting lustrous finish such as it had when it left the factory.

Unlike varnish, Panvar is self-leveling, and quick flowing. This explains why it is so easy to apply and why it never shows brush marks or streaks. This overcomes the big objection car owners had to refinishing their cars themselves.

Unlike varnish, too, Panvar dries hard within eight hours; just apply at night and the car is ready for use in the morning.

Garagemen make big profits refinishing customers' cars over night. Results are sure and the work is easy.

Retail Selling Price

Quart - - - - - - $1.50

Packed 12 quarts to the case for dealer trade. Advertising signs and envelope folders in each case.

THE PANVAR COMPANY

608 Bulletin Bldg. Philadelphia, Pa.

H. A. MEYERCORD, Sales Manager

SPECIAL TO DEALERS



Live dealers stock Panvar and profit by the Panvar Sales Plan.

If your jobber cannot supply you PANVAR we will ship a case of 12 quarts, all charges paid, for $12.00 to any point in the U. S. (12 samples and advertising enclosed in each case).

Name .....

Business .....

Address .....

Name of Jobber .....

This Offer to Prepay Delivery Charges for 60 Days Only

TRY PANVAR—SEND 10c. FOR SAMPLE

AUTO OWNERS FOR $1.50

We will send one quart, all charges paid, to any point in the United States direct, if your dealer does not carry Panvar.

Name .....

Address .....

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455 ft. Deep
135 ft. Frontage
60,000 sq. ft. of Ground Space



Three-story Brick Building. Large Yard and Private Switch Track

This Is the New Home of

DEARBORN UNIVERSAL TRUCK UNITS

The above is a photograph of our new plant, which we have occupied since the first of May.

This move into our new building, which is vastly larger and more modern than the old plant, was made necessary by the greatly increased demand for Dearborn Truck Units and the National success of our product which converts any make of car into a One or Two-Ton Truck.

Our policy of building the best; our liberal selling plan to dealers and the all 'round satisfaction that Dearborn Units have given are responsible for our substantial growth.

In the purchase of our new factory building we have increased our manufacturing facilities more than three times our former capacity and will continue to make Dearborn Units the best the market affords.

DEALERS: Now is your opportunity to take on this most popular line of superior truck units. And with our increased output we are enabled to grant additional exclusive territories not already taken up. Write or wire for particulars.

DEARBORN TRUCK CO., 2518-25 West 35th Street, CHICAGO

S-M-C

Trade Mark Registered U. S. Patent Office

Every Auto Accident is a National Liability

nowadays, when congested transportation facilities make it a patriotic duty to keep every car running every day. Protect your car, your family, your country, with

S-M-C
ASBESTOS BRAKE LINING

Silent—Sturdy—Slip-Proof

Dependable in every emergency, everlastingly durable; honestly made, and marketed on a fair deal platform —S-M-C benefits both user and dealer.

Look for the **S-M-C** on every roll of brake lining —it's your protection.

S-M-C is made in rolls of all widths, up to 6 inches.

DEALER'S COUPON

Staybestos Mfg. Co.
5541 Lena St., Phila.

I want your dealers' proposition on S-M-C Brake Lining and Universal Transmission Lining, particularly on your $1.00 Ford Set.

Name .....

Address .....

City and State .....

UNIVERSAL

Trade Mark Registered U. S Patent Office

TRANSMISSION LINING

offers a remarkable business opportunity for live dealers.

Because it is superior in service to any cotton lining heretofore produced. Quick in action, as sure as it is speedy. Quiet—absolutely chatterless. Compactly woven like **S-M-C**, then treated with a perfected compound, which makes it slip-proof, waterproof and oil-proof.

SET FOR FORDS

$1 Complete

includes three proper lengths for Ford transmission bands and all rivets required. All boxed in a handy package—as easily sold as a spark plug.

Get Our Quantity Prices
on this quick seller—it's a good leverage for the trade of the big Ford family.



STAYBESTOS MFG. CO.

5541 Lena Street, Philadelphia

The "Modern" Factory Equipped to Make All Types of Brake Lining and All Widths Up to 6 Inches

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BENFORD'S GOLDEN GIANT

WE have a large corps of salesmen who call on the dealer trade of this country continuously.

Several of them "make" your town three or four times a year.

Use them—they are a fount of good business information. Each man visits 3000 stores a year—every year—and the tips they can give you on sales and display methods and new and better ways of handling business are all as good as cash to you. Submit your problems to them—they will give you interested service that will smooth out many a difficulty.

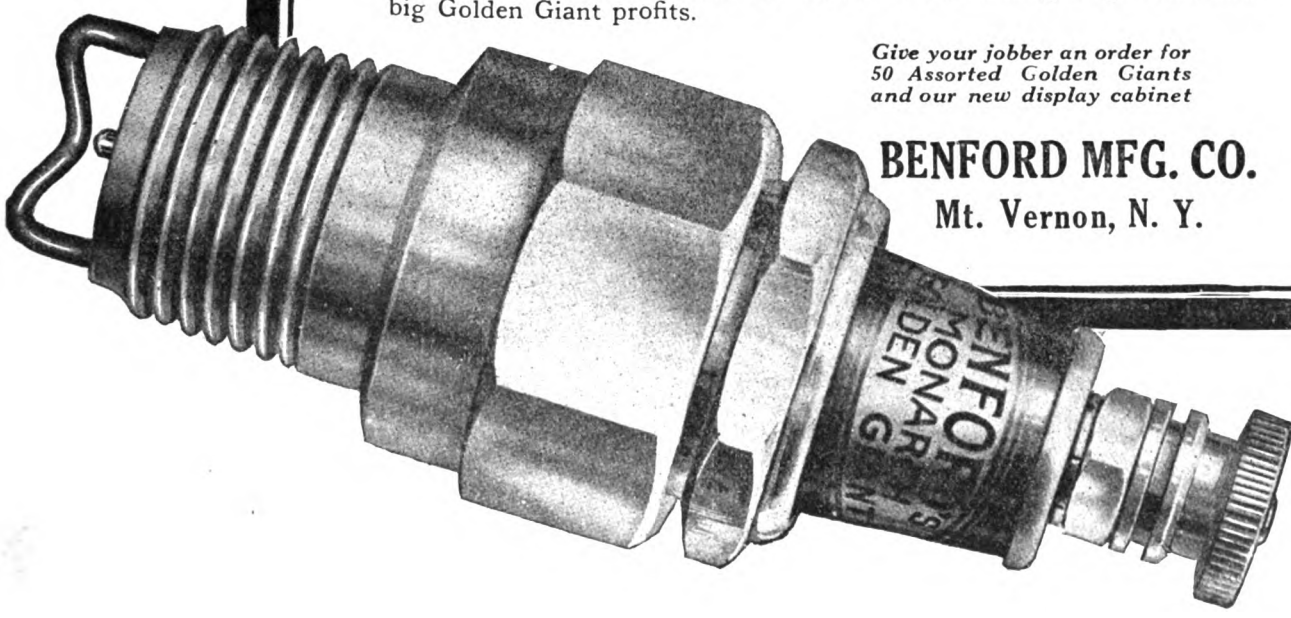
OF course, they'll sell you Golden Giant spark plugs. They'll set up a window for you, make a show case display, and furnish you with sales information on this masterful plug that will enable you to sell it in competition with cheap plugs every time you start to put over a sale.

Because Golden Giants mean more profit to you—on fast-moving merchandise whose beautiful appearance just melts sales resistance, like snow before the Spring sun.

We plate every Golden Giant with pure gold—it's the only fit way to finish off this splendid plug. It's our promise to ***you*** and ***your customer*** of superior service.

Last year's vast increase in our sales showed how well the plugs made good on our promise. And don't forget—the only reason our business increased was that our dealers were making large sales and big Golden Giant profits.

Give your jobber an order for 50 Assorted Golden Giants and our new display cabinet



BENFORD MFG. CO.
Mt. Vernon, N. Y.

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WITH THE ARRIVAL OF

Superford HONEYCOMB RADIATORS



For Ford Pleasure and Commercial Cars

The FORD OWNER is now assured of a HIGH-CLASS RADIATOR, carefully constructed, that will render service efficiently and greatly improve the operation of the motor.

These Radiators Are Built with:

The Same THOROUGHNESS
The Same THOUGHT
The Same CARE
The Same MATERIAL
The Same SKILLED ARTISANS

That Have Made the Name **"SUPERFORD"** Synonymous with Quality and Dependability in Motor Cooling. Radiator Units Are Made of Brass.

MODEL No. 16-F
For 1909 to 1916 Ford Cars
Made like the 1918 in two units, with black detachable casing.
Price Each, $28.00

SUPERIOR AUTOMOBILE PRODUCTS

MODEL No. 18-F
For 1917-1918 Ford Cars
Made in two units, with black detachable casing. . . . . .
Price Each, $30.00

Catalog No. 6 Now Ready—Write for Trade Proposition!

SUPERIOR LAMP MFG. CO., 136 W. 52nd St., NEW YORK, U. S. A.

NATIONAL PRESTIGE

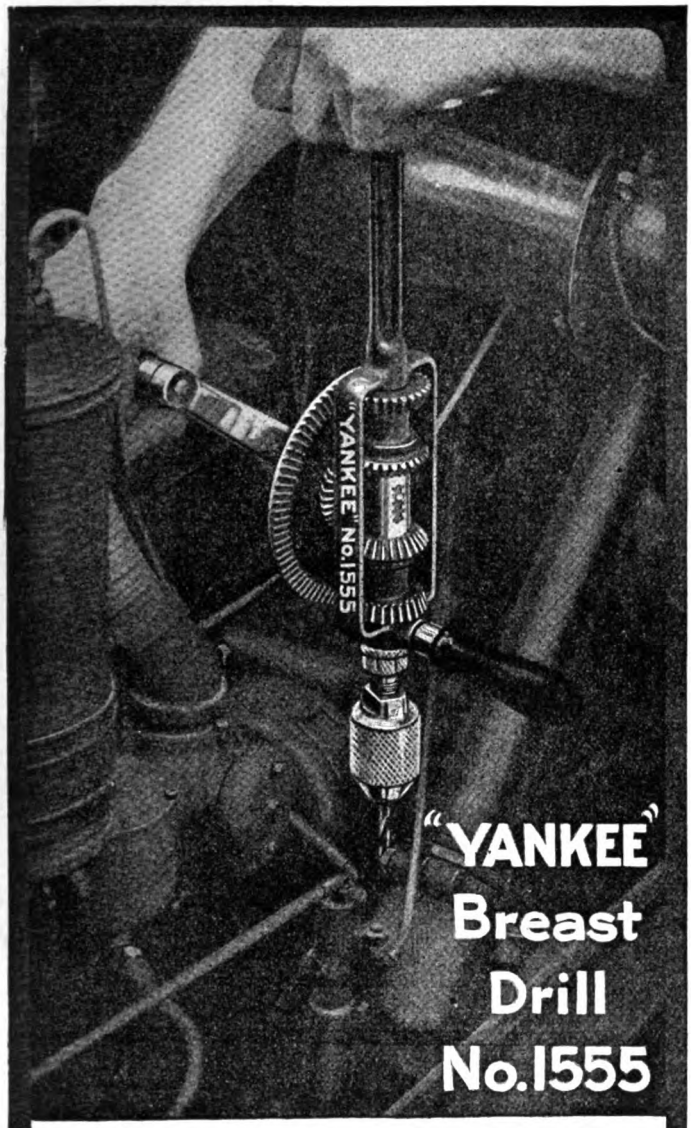
of National Rubber Tire Filler was won through exceptional performance in forever eliminating the bugaboo of auto pleasure—punctures and blowouts.

Made of Pure Rubber, cut in small particles treated, moulded and vulcanized by our special steam process. Fits all the different size casings. No inner tube and air used, eliminating the cause of all tire trouble. Stops the expense of buying, repairing and replacing the inner tubes. Doubles the life of the casing—reducing the cost one-half. Can be transferred and re-transferred as often as is necessary. Has been sold throughout the U. S. and many of the Foreign countries for six years. Has years of actual service record back of it. It has all the easy riding qualities of the air-filled tire, with none of its faults and uncertainties. No waiting to use your car; it is always ready whenever you need it. Let us send you small sample and tell you more about it.



NATIONAL RUBBER FILLER CO.
208 College Street **MIDLOTHIAN, TEXAS**

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"YANKEE" Breast Drill No. 1555

FIVE ADJUSTMENTS—and Two Speeds! make the "YANKEE" Ratchet Breast Drill the handiest tool the garage mechanic can have. Scarcely a drilling job about a car you can't do with it—jobs you wouldn't think of tackling with ordinary drilling tools. No place too cramped; no need to take down construction.

Double Ratchet, for example, keeps drill cutting on both forward and backward movements of crank, no matter how slight: No motion lost; no time wasted. Multiplied Man Power!

Adjustments: (1) Plain Drill; (2) Left-hand Ratchet; (3) Right-hand Ratchet; (4) Double Ratchet; (5) Gears Locked. Both Ratchet and Speed changes made at a finger-touch—without removing drill from work.

"Yankee" Ratchet Breast Drill

No. 1555. Length 17 in. 3-jaw chuck holds round shanks up to ½ inch.

No. 555. Length 17½ in. 2-jaw chuck for both rounds and squares.

Price $8.35

Your dealer can supply you

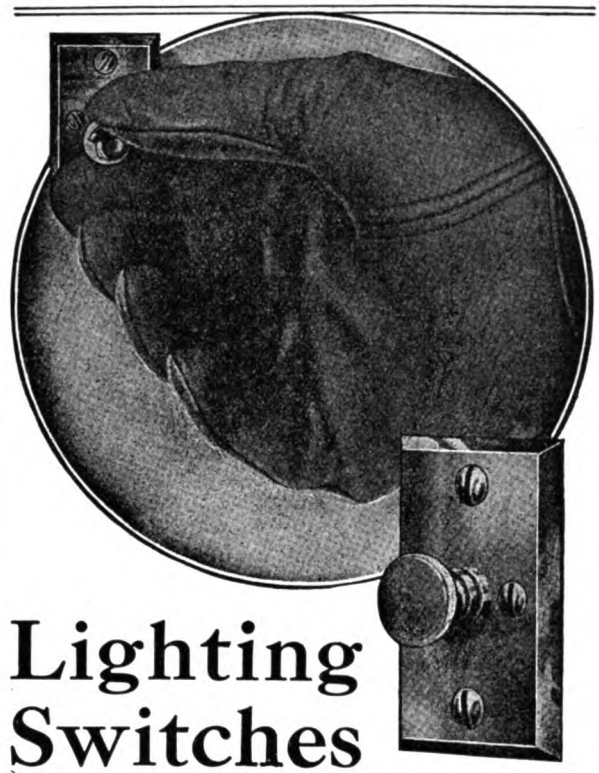
Write us for "'YANKEE' Tool Book" of Breast and Hand Drills, Bench Drills, Tap-wrenches, Screw-drivers and other garage tools.

NORTH BROS. MFG. CO., Philadelphia

"YANKEE" TOOLS

Make Better Mechanics

CONNECTICUT



Lighting Switches

are the neatest, simplest and most easily installed equipment of their kind on the market.

Easily operated with a gauntleted hand.

Simple construction insures unending service and satisfaction.

Connecticut switches are designed to provide every arrangement of lighting control that can be desired.

One switch for all lights, individual switches for each, or any choice of functions, individual or in combination.

HEADLIGHTS

The use of resistance for dimming the use of double filament bulbs, or the use of large or small bulbs.

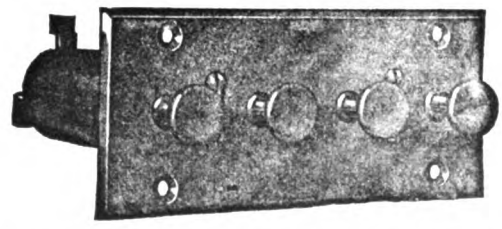
HEAD, SIDE AND TAIL LIGHTS

Head and tail lamps on and off together. Side and tail lamps on and off together.

DASH LAMP

Individually or in conjunction with tail light. These are the principal functions of our standard switches but these by no means indicate the limits of control to which we are confined. Every practical arrangement has its switch.

Trade catalog illustrating and describing full line upon request



CONNECTICUT TELEPHONE & ELECTRIC COMPANY
Meriden, Conn.

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Not many people bought new cars this season—they are using their old cars.

Not many people will travel by rail this Summer, they will tour by auto.

Both these situations mean more overhauling business.

If you handle Inlands, you'll get more of that business, because everybody, everywhere, knows how much Inlands save them and how little they cost. Get a stock of Inlands now—your jobber has them.

Send for Booklet and Prices

Inland Machine Works
802 Mound Street, St. Louis, Mo.

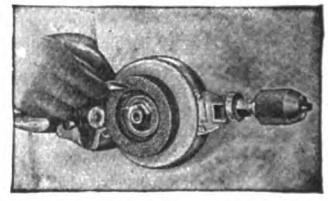


INLAND
1 PIECE PISTON RING



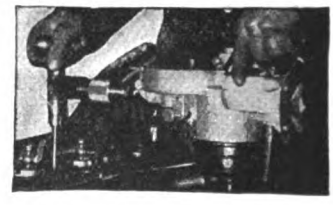
Temco Garage Outfit

Electric Drill
Emery Wheel
Valve Grinder
} All in One



This Garage Outfit is making a hit all over the country, cutting cost, increasing capacity and boosting profits.
You will have dozens of uses for the Temco Garage Outfit every day in the year.

It Drills—Taps—Grinds Valves—Sharpens Tools



PORTABLE—you take the tool to the job—not the job to the tool. Attach to any electric light socket (D.C. or A.C.), and it's ready. Starts—Stops—Reverses instantly by finger switch on tool.

Also grinders, tool post grinders, buffers and larger drills.
Temco Tools always satisfy.

Write today for catalog or see your jobber.

THE TEMCO ELECTRIC MOTOR COMPANY
303 SUGAR STREET, LEIPSIC, OHIO

TEMCO
Garage outfit

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"NORMA" PRECISION BALL BEARINGS

(PATENTED)

The highest speeds in car or truck—many times the speed in any other part—are carried by the magneto and lighting generator. At high car or truck speed, the speed of these accessories may reach tremendous figures. Is further argument needed, to demonstrate the vital necessity of speedability in ignition and lighting apparatus?

For years past, in America and abroad, in the magnetos and lighting generators invariably identified with cars and trucks of notable dependability, "NORMA" Ball Bearings have been the standard bearings. Their preeminence in this field is the result of an unbroken record of satisfactory performance.

Be Sure—See that your Electrical Accessories are "NORMA" Equipped

THE NORMA COMPANY OF AMERICA

1790 BROADWAY NEW YORK

Ball, Roller, Thrust and Combination Bearings.



REX Automobile Jack

FOR

Garage and Private Service

ENGINEERED TO PERFECTION

High powered, quick in action and made to last regardless of hard usage.

BECAUSE

Constructed entirely from high grade Heat Treated Steel and Malleable.

It rolls on four good strong wheels and a mere boy can lift any car.

BECAUSE

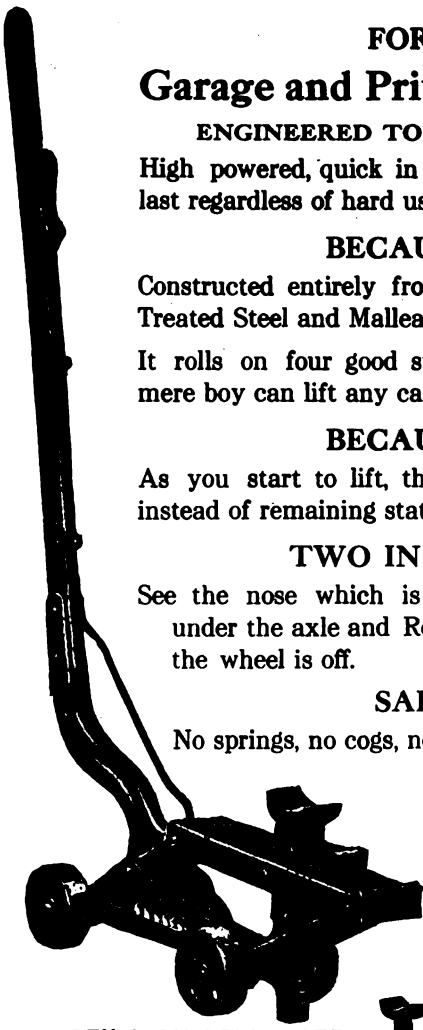
As you start to lift, the REX rolls under instead of remaining stationary.

TWO IN ONE

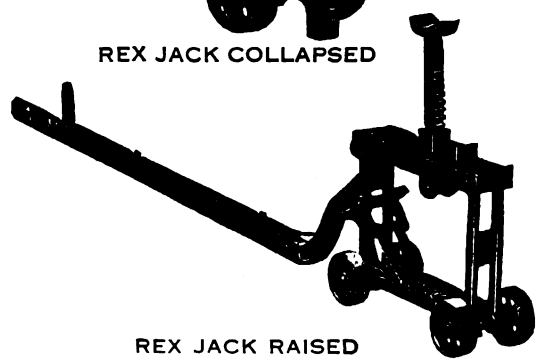
See the nose which is put there to hook under the axle and Rex Jack it up when the wheel is off.

SAFE

No springs, no cogs, no ratchets, but automatically locks at any height thus insuring safety at allheights.



REX JACK COLLAPSED



REX JACK RAISED

Glides under the lowest part of any car even though they be equipped with bumpers or extra tires and raises to a neight of 20½ inches without blocking.

FRIENDS

Thousands in use and not a single complaint but hundreds of compliments.

As a time saver it has no equal and will pay for itself any busy week. Ask any user.

Stocked by your accessory jobber.

WEIGHT 47 LBS. LIST PRICE $20.00

Some Day you will Buy this Time Saver

B & M MANUFACTURING CO.

5810 to 5814 S. Wood Street, Chicago, U. S. A.

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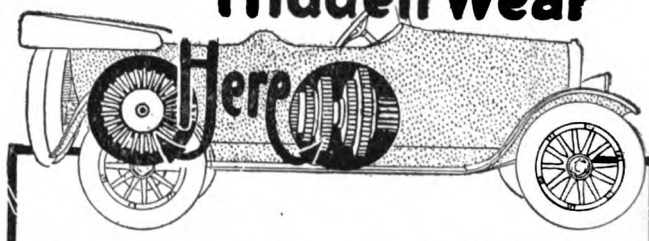
THE
ANTHONY
TIRE PUMP

A
REMARKABLE
ACCESSORY

WRITE US

The Anthony Company, Long Island City, New York

Avoid Hidden Wear



Out of Sight—Out of Mind

THE Differentials and Transmissions are out of sight but these gears work hard and require the best possible protection from frictional wear. If you wait until they become noisy you have allowed serious wear already.

The ideal lubricant for these gears is "K00 special" grade of

TRADE MARK REGISTERED IN
NON-FLUID OIL
UNITED STATES PATENT OFFICE

—It follows the gears, cushioning them always from abrasion—but unlike grease it will not melt and run out in summer or thicken in winter.

NON-FLUID OIL is produced from the finest Pennsylvania crude, made adhesive by means of our exclusive process and has none of the non-lubricating fillers used to "body" common grease

Almost every dealer has NON-FLUID OIL in orange cans.
"K00 special" grade for gears;
"K000" for bearings and differentials that are not oil tight.

The New York & New Jersey Lubricant Co.
165 Broadway, New York

INEXPENSIVE
Yet PROFITABLE



Spark Plugs contribute as much toward a car's performance as the most costly, elaborate part. Inexpensive as they are, motorists should be sold plugs with the same consideration that is given an axle, or any other part.

REFLEX SPARK PLUGS



REFLEX equipped White Truck in industrial work, doing the work of a gang of men.

Reflex dealers hold the trade of car and truck owners who appreciate what a good spark plug means to daily operation.

Reflex Plugs were selected by White Engineers for White Trucks for war zone and intensive industrial work. Take advantage of the time and money they spent experimenting—sell Reflex Plugs—make good profits—and satisfied customers. You are authorized to sell Reflex Plugs on a money-back guarantee.

Write today for our profitable proposition.

THE REFLEX IGNITION COMPANY
1711 Payne Avenue - - - Cleveland, U. S. A.

Guaranteed for 10,000 Miles



EVERY Brictson Tire is sold under a specific 10,000 mile written service guarantee. This guarantee is the longest and strongest ever put behind a pneumatic tire and is a positive protection to every purchaser.

"Absolutely Puncture Proof"

Brictson Tires are puncture proof, and proof against blowouts, skidding, rut wear, rim cuts, and can't be damaged by oil or gasoline. Wonderful resiliency, easy riding qualities as well as economy commend them to every car owner.

The Big One-fourth Retread Feature

Should the tread surface wear out after 10,000 miles of service you can get a new retread for one-fourth the original cost of the tire, instead of buying a new tire, and you keep the remaining three-fourths in your pocket. With ordinary service the Brictson Tire should run enough beyond the 10,000 miles to require one or two extra retreads. The more retreads you use the cheaper your service.

FREE TRIAL OFFER

To convince you the Brictson Tire will give satisfaction TRY THEM ON YOUR CAR AT OUR EXPENSE. Write today for this Free Trial Offer, a copy of our guarantee and full information about Brictson Tires.

BRICTSON MFG. COMPANY
Dept 168
1015-24 Woodmen of the World Building
OMAHA, NEBRASKA

Brictson Pneumatic Tires

Please Mention the Automobile Dealer and Repairer when writing to advertisers.

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BRAENDER

"The Tyre to Tie To"

From
the User's standpoint
"BRAENDER Quality"
stands for a definite, dependable
standard of excellence, and

BRAENDER TIRES

are accepted as giving full value for the money —both in service and satisfaction.

This means that every sale of BRAENDER TIRES makes a satisfied and enthusiastic customer, ready to recommend "Braender" equipment to his fellow car owner.



Do you realize that this makes BRAENDER TIRES big profit-makers for DEALERS?

Write today and get the benefit of our Advertising and Dealer Co-operation Helps.

Red and Gray Inner Tubes

"The Tyre to Tie To"

BRAENDER RUBBER & TIRE CO.
FACTORY: RUTHERFORD, N. J.
Branches
NEW YORK.....250 West 54th Street
CHICAGO.....1350-4 S. Michigan Avenue
PHILADELPHIA.....683 N. Broad Street



Don't Drive Blindly Use the RAIN-A-WAY Pad

Just rub the pad over the windshield—takes only a few seconds—and the rain drops won't collect to dim your view of the road—the mist won't gather, no matter how cold it is. Your vision will stay clear in the worst driving weather. The pad is impregnated with a secret formula. Not greasy —non-evaporating. Lasts for months.

Just a Rub with the Pad and the Rain Won't Bother

"Greatest little convenience ever," says one user. You'll say so too. No craning your neck outside the car to keep your eye on the road. No wipe, wipe, wipe with windshield wiper or cloth. It's a *real* convenience and worry-saver. Send a quarter for a Rain-a-way Pad. Use the coupon.

Sells Itself Dealers!

Rain-a-way Pads sell on sight. Fills real need. Attractive display carton in colors holds dozen packages. Sells like hot cakes. Liberal discounts. Ask your jobber's salesman, or order direct—mentioning jobber' name.

Badger Mfg. Corp'n
313-16 Milwaukee St.
Milwaukee, Wis.

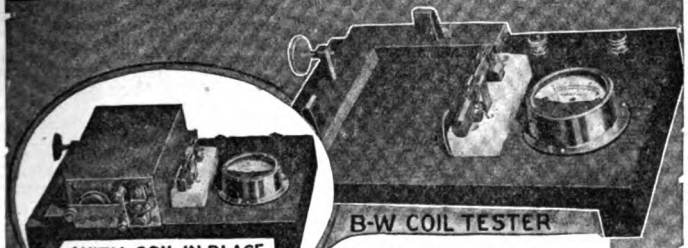
Send 25¢ for Sample

BADGER MFG. CORP'N
313-16 Milwaukee St., MILWAUKEE
Gentlemen—Enclosed is 25c for Rain-a-way Pad. Address same to



Name .....
St. or R. F. D. No.....
P. O.....*State*.....
Dealer's or Jobber's Name .....

B-W COIL TESTER



This Instrument is an absolute essential in every shop handling Ford Repairs. With it a full set of coils can be tested and accurately adjusted in less than five minutes. Render the most efficient service. Save yourself time and money. Eliminate guesswork.

ONE DAY'S USE WILL PAY FOR THIS TESTER - - - ***Price $6.00***

B-W Magneto Tester

Ascertains the exact condition of any Ford Magneto, whether the engine is on the work bench or running in the car. A minute's time is all it takes. Used by Ford Service Stations the world over.



Free Trial Offer

Because we know you will appreciate the true value of this remarkable instrument after once using it, we will send one on ten days free trial to any responsible repair man. Ask us about the proposition. Address,

Ballman-Whitten Mfg. Co.,
4044 Olive St., ST. LOUIS, MO.

The Business of The Times

START A TIRE REPAIR BUSINESS WITH THIS GREAT EQUIPMENT

THE triumph of our long manufacturing experience, and beyond every question of a doubt the greatest achievement in the building of tire repair equipment since the advent of vulcanizing.



A complete tire repair plant that will make both outer casing and inner tube repairs on practically all makes and sizes of tires on the market; only possible at the price asked through master designing and enormous output. Capacity recently doubled on popular size tires, with no advance in price as yet.

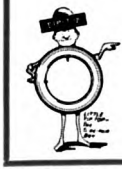
New-Type-F
BIG CAPACITY VULCANIZER
With Self-Contained Steam Boiler
Only $180

Send for Free Booklet

The Akron Rubber Mold & Machine Co.
917 Sweitzer Avenue, Akron, Ohio

Pacific Coast Distributors
GEO. W. ENO RUBBER CO.
280 Golden Gate Avenue
San Francisco
1926 So. Los Angeles Street
Los Angeles

TIP-TOP OF AKRON
TI-RE-PAIR OUTFIT

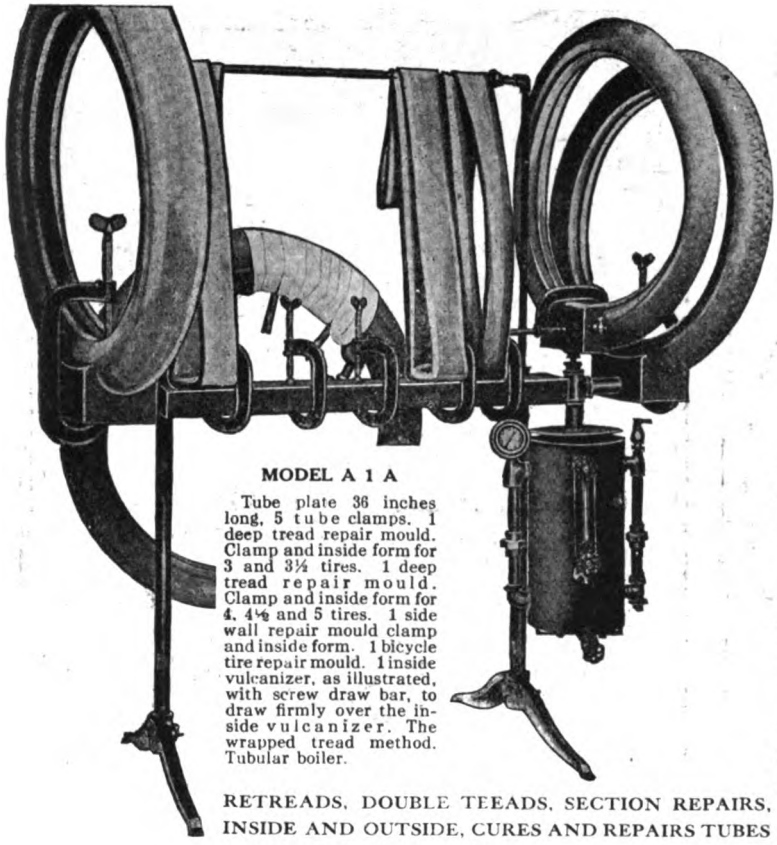


Gentlemen: Please send full particulars regarding your Ti-Re-Pair Equipment, and copy of free booklet, "Tire Repairing, the Business of the Times." A.D.&R.

NAME.....

ADDRESS.....

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MODEL A 1 A

Tube plate 36 inches long, 5 tube clamps. 1 deep tread repair mould. Clamp and inside form for 3 and 3½ tires. 1 deep tread repair mould. Clamp and inside form for 4, 4½ and 5 tires. 1 side wall repair mould clamp and inside form. 1 bicycle tire repair mould. 1 inside vulcanizer, as illustrated, with screw draw bar, to draw firmly over the inside vulcanizer. The wrapped tread method. Tubular boiler.

RETREADS, DOUBLE TREADS, SECTION REPAIRS, INSIDE AND OUTSIDE, CURES AND REPAIRS TUBES

"First Month's Profits Paid for the Plant"

THAT'S WHAT ONE MAN WRITES

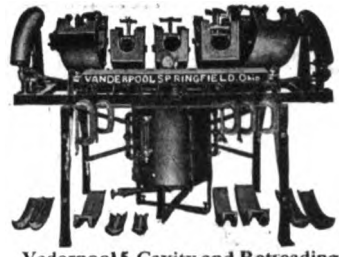
No Experience Necessary—We Teach You How!

THE VANDERPOOL VULCANIZERS

will get your share of the big Spring and Summer tire repairing. Order a Vanderpool Vulcanizer—don't put it off—you lose money every day you delay.

Get into this big profit-making business while work is plentiful—prices are good and everybody has more than they can do. Vanderpool Vulcanizers do the best—yes, the very best work, and that's the kind of work that satisfies customers and builds your success.

Operators of Vanderpool Vulcanizers are selling these machines for us right along—all the time. Ask for our list of users in the U. S. A., Canada, Cuba and South America. Write for the price list today and send this "ad" in with your letter. (A.D.&R.)



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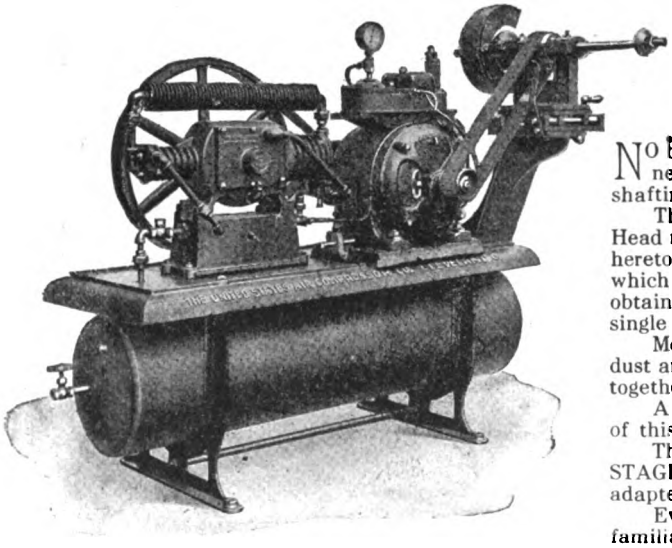


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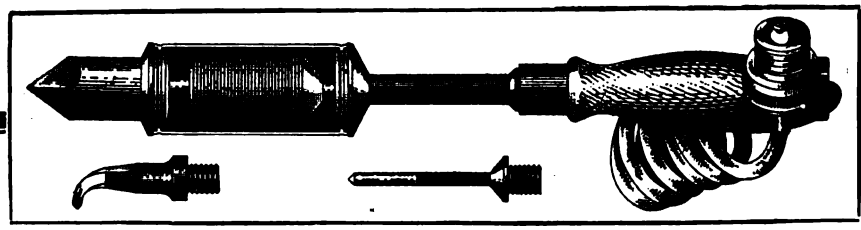
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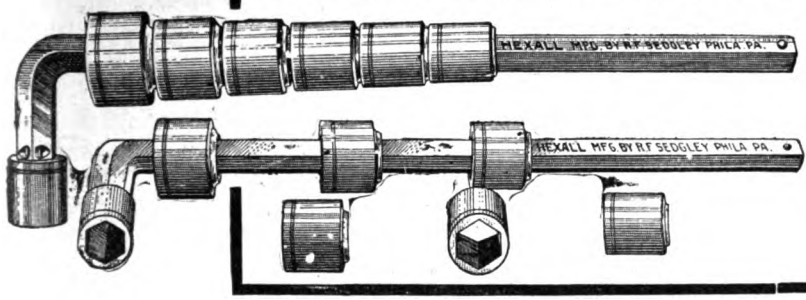
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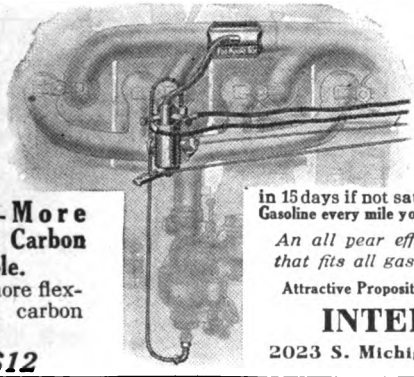
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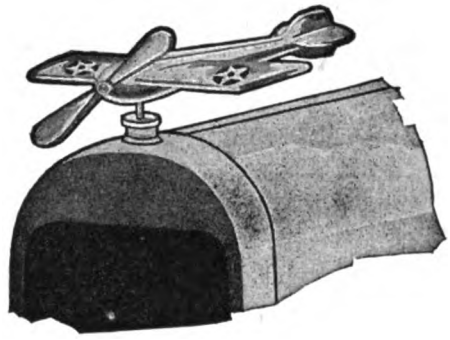
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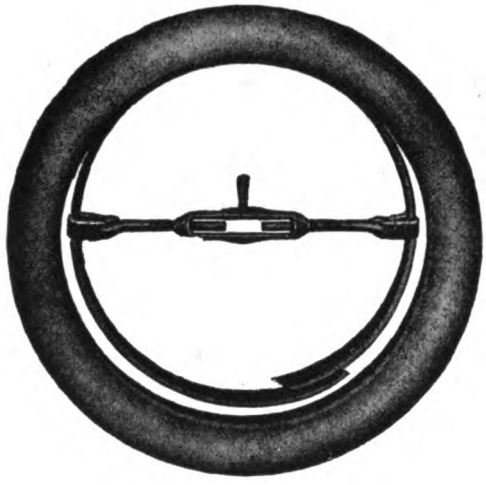


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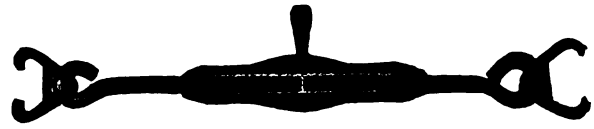


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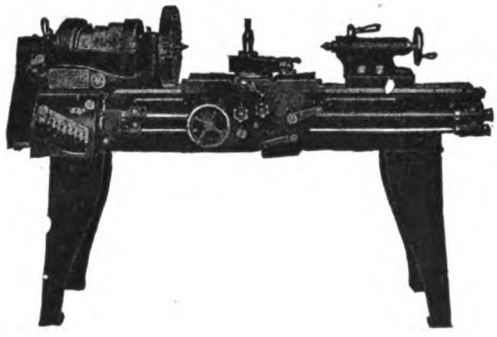
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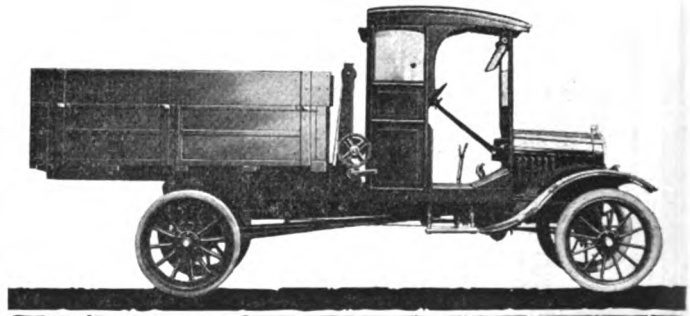
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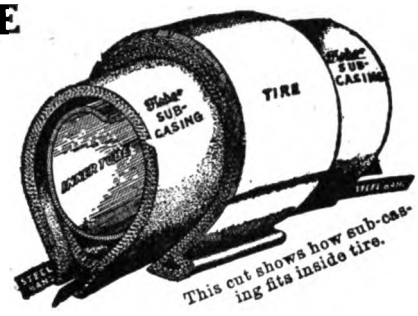
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A JOURNAL OF PRACTICAL MOTORING

Registered in the U. S. Patent Office

VOL. XXV. No. 4. NEW YORK, JUNE, 1918. PRICE {10c. PER COPY / $1.00 PER YEAR

Picking A Second-Hand Automobile.

Points To Observe, Parts to Examine, and Tests To Make When Preparing to Purchase a Used-Car

IN picking out a second-hand car the buyer should always bear a number of things in mind. The car's age does not make any difference to its value. I do not mean to say, however, that a car built in 1900 is just as valuable as a car built in 1917. Everyone knows that this is absurd. What I do wish to say, however, is that the car might be built in 1900 and be in just as good condition to-day as it was the day it was built.

Age is not the deciding factor. Neither should the number of miles which the car has been run be "chalked-up" against it. The one thing that the value depends upon more than anything else is the way in which the car has been used. At the same time, however, all factors must be taken into consideration. A car might be three years old and never have been run more than a hundred miles. Yet it is perfectly possible that the car to-day is worthless. The owner might have left it out in all sorts of weather. He might have lubricated the clutch with sand. He might have run the tires over sharp rocks. He might have forgotten to lubricate the engine at all.

Care Is An Important Factor.

On the other hand the car might be four years old and even run 50,000 miles. If the owner has taken good care of the machine I will venture to say that the car is in better condition to-day than it was four years ago. If the working parts have been properly attended to and adjusted, if the bearings have received the proper amount of lubrication, then the depreciation has been extremely slight. I once was asked to dispose of an automobile which was three years old. In all cases but one, the persons who came to look at the car with the idea of purchasing it asked two questions. First the age, then the price. The two answers which I gave them were sufficient to enable them to make their decision.

They didn't want the car. It was too old and the price was too high. If the car had been two years old, the prospect would have purchased it. I said that there was one exception and as I remember it he didn't even ask the age of the car. First his question was the price, then he made a very careful inspection and a road test to see if the car was worth the money. He bought it and is satisfied. The point which should be brought out is that when one is purchasing a second-hand car they should not be unduly influenced by the age of the machine. They should make an examination of the car itself and let the examination determine its service value.

If the car has been operated by an experienced automobilist and evn if it is three or four years old, is it not of more service value than a car six months old which has been driven by a person who knows nothing of automobile machinery and he has allowed the machine to rack itself to pieces.

Indexes of Wear.

An automobile is an intricate piece of machinery and one is very apt to be misled by outward appearances. The car body, the upholstery, the top and the mudguards tell a story without words. They are the first indexes to consult. If the body looks as though it had been through a tornado or a battle, the chances are that the mechanism has suffered a like fate, but be not mislead. The car body may be in perfect condition, yet cover an engine or transmission that is nothing more or less than a pile of junk.

A definite method should be used in finding the car valuation, and as space is limited, I will take up only the machine part itself, leaving the examination of the body to the purchaser.

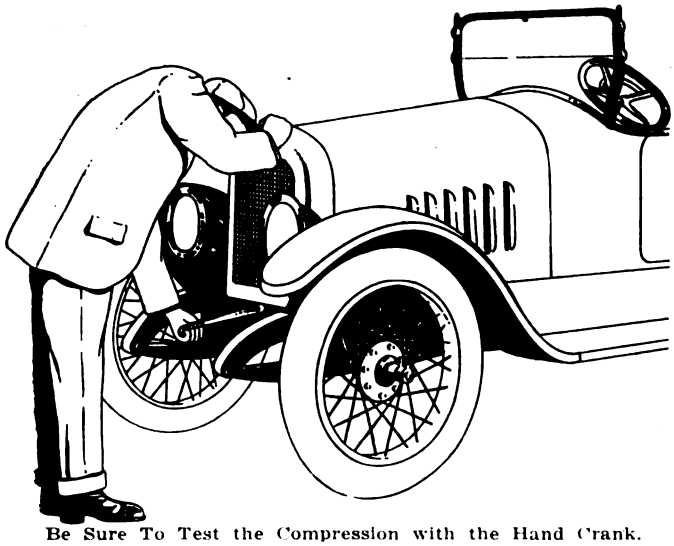
The test or tests may be divided into three parts. First, the careful examination of the units; second, the road test; and last, the efficiency test. One should first examine the engine for it is the heart of the automobile. No matter how good the machine may be otherwise, if the engine is poor the car might just as well be left at home.

Test Compression First.

After being sure that the switch is in the "off" position, the engine compression should be tested. This test is

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made with the hand crank. The crank should be inserted in the ratchet at its lowest position and lifted slowly. If any of the cylinders are scored or if the compression



Be Sure To Test the Compression with the Hand Crank.

escapes past the valves or the plugs, the operator will find little resistance in lifting the crank. A quick pull of the crank may show considerable compression, but a slow lift shows the true state of affairs. The compression should be springy and while the engine is being tested one should keep his "weather ear" open for the escape of air from the engine.

The compression test is the first one to make. It should always be the last as well for if the salesman is dishonest there are a number of ways in which he can increase the compression temporarily. The final compression test should be made after the car has been run five or six miles. If possible, a compression meter should be used in each cylinder. The prospective purchaser should find approximately how many pounds per square inch the engine should show, by comparison with another car of the same make, and be guided accordingly.

Examine Cooling System.

After having made sure that the compression is good, start the engine, and after it has been run for about ten minutes inspect the water in the radiator. If the water boils over or steams, it is a bad indication and a sign that something is wrong. Do not race the engine but endeavor to keep it throttled down as much as possible. Practically every engine on the market to-day can be run at a speed as low as 500 revolutions per minute. If the engine will turn slower than that figure, without missing or backfiring, it is an indication that the compression is good, that the electrical system is functioning properly, and that the carburetor is properly adjusted. It is a much more practical test than operating the engine at excessive speeds.

I have seen salesmen impress a prospective purchaser by racing the engine at speeds from 2,000 to 3,500 revolutions per minute, and will admit that the performance was impressive as well as noisy, but as far as I know the test was as worthless as running the car over a precipice to prove that it had speed.

While the engine is being operated keep one eye on the exhaust. If the exhaust is in the form of a heavy black or blue vapor, the symptoms are bad. They indicate an escape of oil into the cylinders or the excessive consumption of gasoline. Throttle the engine to its lowest speed and open the throttle quickly. The engine should accelerate rapidly without back fire. If the action is sluggish, it indicates carburetor trouble.

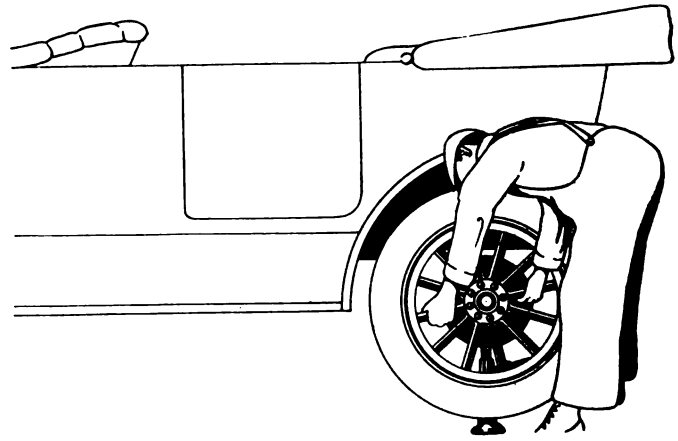
Engine Should Not Act Sluggish.

If the engine acts quickly and obeys the throttle, the test is satisfactory. Short-circuit two of the spark plugs and note whether the engine will run on the other two cylinders. In turn, do this to all plugs, being careful, however, not to operate the engine for any length of time on the two cylinders. For the time being, this completes the test of the engine.

Jack up both of the rear wheels and put the transmission gears into neutral. Turn one of the rear wheels in either direction and listen to the gear action in both the rear axle and the transmission. All of the gears should be tested in this way, and should the gears be faulty or improperly adjusted there will be a grind or squeak either in the transmission or the rear axle.

To test the differential gears be sure that the switch is off, engage the high speed gears, throw in the clutch and turn one of the rear wheels. The other rear wheel will turn in the opposite direction, bringing into action the two differential gears in the differential housing. Listen for any undue noise. Remove the jack from under one of the rear wheels and turn the other wheel as before. Have an assistant throw out the clutch and then listen to the action of the rear axle again. This test will indicate any trouble in the master or pinion gears. After this test has been made, have the assistant engage, one at a time, the various speeds in the transmission. Listen to the transmission gear set as each separate set of gears is engaged.

The next test to be applied covers the whole power system. First be sure that the rear wheel is securely supported by a box or heavy blocking so that it will not shake back to the ground or the floor. Then start the engine.



The Rear Wheels Should Be Examined for Lost Motion.

Operate the engine at as low a speed as possible and listen to the power system, the transmission, and the rear axle. Try the various gear ratios and note the clutch action. It

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is a good time to find if there is excessive friction between the engine and the rear axle. If there is too much friction, the engine will be slowed down when the gears are engaged. Lift the other rear wheel from the ground and try the same experiment with it in this position.

Test the Brakes.

See that both the emergency and service brakes operate smoothly but be careful not to apply them with the clutch engaged. Be sure to note whether there is any lost motion between the engine and the rear wheels. An excessive amount of lost motion will be evidenced by jerky wheel action and is an evidence that the gears do not fit properly with each other. In making the test by hand, this same fact should be noticed and one should not be able to turn the wheels more than one-eighth of a revolution without affecting each other, or the engine when the clutch is engaged.

After having made these tests, remove the blocks and examine the wheel bearings. The wheels both front and rear should have little or no side play. Jack up the front wheels and spin them. See that they run freely and note whether the rims line up correctly. If the tires, to use the slang expression, "'wobble" from side to side, the wheels are out of true. Examine all of the rims and spokes, they should be tight and firmly joined together. Little need be said about the condition of the tires. The tires are another matter and do not add or detract from service value of the car. One should make allowances for tires in the price. Examine the steering mechanism very carefully. This is an important part of the car and should be worn but little.

Between the steering wheel and the front wheels there will probably be a slight amount of lost motion. This amount varies in different gears, but as a rule the steering wheel should turn not more than one-third its circumference before affecting the wheels. This completes what might be termed as the possible examination of the car mechanism.

The Road Test.

The next test to be made may be termed the road test. Measure the gasoline in the tank and note the amount of lubricant in the engine then decide upon a tour of about ten miles over which to run the car. Start the engine and engage the reverse speed. Engage the clutch slightly and see what effect the reverse action has upon the engine. The car should "back" without materially affecting the engine's operation for with the reverse ratio the most power is obtained.

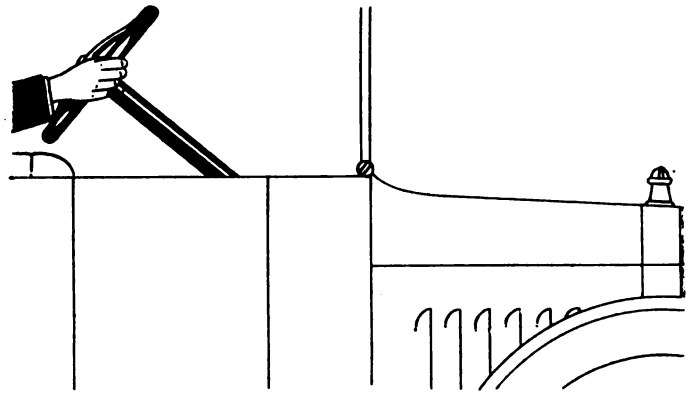
If the reverse operation is satisfactory, engage the low speed gear and run the car two or three hundred feet in low. Listen to the transmission and the rear axle for poorly adjusted gears. Engage the intermediate speed and do the same. Finally try the high speed and note the conditions as before.

If the car is on level ground and is in good condition, it may be throttled as low as five miles per hour. Try this experiment. Then see if the engine picks up so that the car may be speeded to 15 or 20 miles an hour very quickly. Any sluggishness of the engine may be noted immediately. Like the low speed engine test, the low car speed test is more satisfactory than a car speed test of 40 or 50 miles an hour.

Many engines in poor condition can be made to drive a car 50 miles an hour but seldom can be throttled to five miles an hour. Drive the car to a steep hill and at the top stop the engine, allowing the car to coast down the hill.

Locating Power Plant Noises.

While the car is coasting, engage the different gears and listen to the transmission. With the engine stopped this test is an excellent one for finding troubles in the



The Steering Wheel Should Not Have an Excess Amount of Lost Motion.

transmission system. It is also an excellent one for locating squeaks and rattles in the body. Bear in mind that body squeaks and rattles must be silenced before one can hear noise from the engine or transmission.

The test of the machine on the road and hills is a matter for comparison only. Before purchasing the car one should compare its operation with other cars of a similar make. The car should be driven over average roads for a distance of at least ten miles. Then the amount of gasoline consumed should be computed and comparisons made with the amount of fuel necessary for cars of a similar size. A car that burns an excessive amount of gasoline is a poor investment unless one is sure that he can eliminate the trouble by the installation of up-to-date devices or parts. After the engine has been returned to the garage, the compression should again be tested and it should be as great if not greater than it was before the beginning of the test. Note whether the water in the radiating system is steaming or boiling. It should be neither.

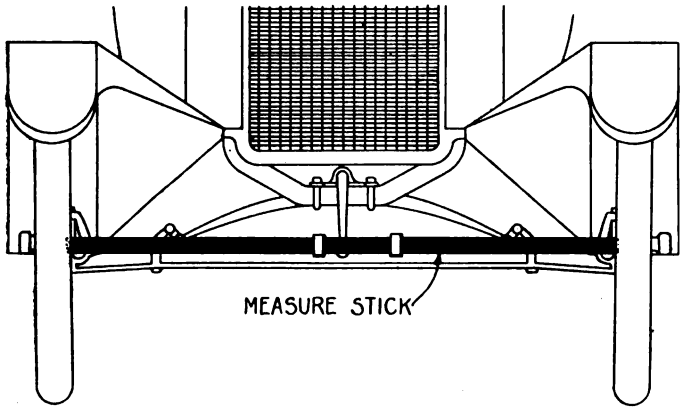
Examine Storage Battery.

The storage battery should be examined and tested with a hydrometer. After a ten mile run with no lights burning, the specific gravity of the electrolyte should average from 1.275 to 1.300. If possible one should ascertain where the storage battery was charged last and from the battery station man find out just what condition of the battery might be. If the specific gravity of the electrolyte does not indicate a full charge after ten miles of running, one should make sure that the generator is functioning.

To be sure of this fact start the engine and notice

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whether or not the current indicator or ammeter indicates "charge." Turn on all of the lights and see if the generator furnishes enough current for all of the lights and the ignition system while it is running. Stop the



Measure the Distance Between the Front Wheels, Both at the Front and Back

engine and again notice the ammeter. Be sure that it points to "discharge" while the lights are burning. This test is simply to make sure that the ammeter is not connected with the circuit wrongly, for it would be very possible for a dishonest owner to so arrange the ammeter that it would indicate "charge" when it should indicate "discharge."

In this way one could not be sure that the generator was functioning.

One should inspect all of the units so as to make sure that none of the castings are broken or cracked. Breaks in either the engine or the transmission are apt to be evidenced by excess amounts of oil or grease upon the outside.

Not until after all of these tests have been made can the prospective purchaser get a true idea of the service value of the car. Aside from these tests, the prospect should take into consideration the owner's or driver's attitude in operating the car. If the owner appears to be a careful driver, it is one point in favor of the car. If, on the other hand, the owner is careless and abuses the machine the purchaser should make the examination a very careful one.

EXCESSIVE COMPRESSION.

One Trouble in an Overhauled Gasoline Engine Which May Result in Burned Bearings and Diluted Lubricant.

OCCASIONALLY we receive letters from our readers complaining of excessive carbonization in engine cylinders. In many cases the readers tell us that they have had the engine overhauled recently, the cylinders rebored and new piston rings put in. The general opinion among car owners is that oil leakage into the cylinders is caused by loose fitting pistons or rings. In many cases this is true, but it is not always the case.

Not long ago, the writer visited a service station when a car owner came into the shop and told about his car which had just been overhauled. During the course of the conversation it transpired that he had not been obliged to replace the lubricating oil in the base, or put in new oil for nearly a week, despite the fact that he had been using the car almost continually.

The garage man put on his hat and coat and went to look at the car right away because he knew that something was wrong. Sure enough, there was something wrong or at least there might have been, had the car been run very much further.

The car had just been overhauled, new pistons and new rings had been put in and the cylinders reground. The increased compression forced considerable of the condensed fuel into the base, diluting the cylinder oil and taking the place of that which had been consumed. Consequently it would have been a matter of but a short time when the lubricating oil had become inefficient and caused the bearings to have been burned.

In this particular instance, the fuel had been forced into the base but in many cases lubricating oil is pumped into the cylinders, especially if the intake valves open late, when a vacuum is caused by the cylinders which draws the oil upward into them.

The car owner should be very careful of his engine after it has been overhauled and pay particular attention to the lubricating system, bearing the two facts which we have brought out, in his mind continually.

TRACTOR AND TRUCK EXHIBIT.

Practically All of the Middle West Farmers Are Interested in the Big Chicago Show To Be Held in September.

The Second Annual Exhibit of Tractors, Trucks and Accessories is to be held upon the municipal pier, Chicago, Ill., from September 14 to 21, and bids fair to be the largest of its kind yet staged.

The farming interests look forward to it with great enthusiasm for they hope to see the latest tractor and truck models. The exhibitors welcome this chance to put their products before the public for they realize that in this day of efficiency, everyone is looking for machinery and devices with which they may do more business, raise more produce or increase car mileage.

RADIATOR TESTERS WANTED.

The government is looking for men to test radiators and is putting out a general call for such men as care to learn or work at this branch of the trade. The work consists of locating leaks by immersing the radiators in water and noting the places from which bubbles arise. Any of our readers interested in obtaining a position of this sort should write to Charles E. Mack, 480 Lexington Ave., New York, N. Y., Bureau of Aircraft Production, District Office of Production Department.

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How to Place and Distribute Advertising So That It Will Give Results

3—The Kind of Goods To Advertise and the Relation of Turn-Over to the Amount of Advertising Given a Certain Line of Products.

BY FRANK FARRINGTON

MOST of us can remember having seen in small-town newspaper advertisements of the "Hats, Caps, Boots and Shoes" type that covered pretty nearly everything in the advertiser's store, all at one swoop. That kind of advertising never did pay, and it lacks more of paying to-day than it ever lacked before. Competition has made it necessary that advertising bring out some specific thing.

If you were to buy large space in the newspaper and every issue fill it with such statements as this, "Everything in Automobile Supplies, Tires, Oils, Greases, Accessories, Gasoline, Agency for Packard, Ford, Buick and Chalmers Automobiles," your money would produce but a scant return. You would keep your name before the public and they would be reminded that you run a garage, but the advertising would not sell anything. It would not create any demand or encourage the purchase of a single thing you have to sell.



Tell Your Employees They Must Not Leave a Pint of Gasoline in the Hose.

Good advertising means advertising some specific thing and it has two phases. Either you advertise to let people know that you are prepared to supply something they all know about and are interested in using, or you advertise to make people want something, to show them that a certain item or line is desirable for their use.

In advertising to let people know that you sell the thing they are already expecting to buy, you are taking advantage of the manufacturer's publicity or of the habitual use of some one commodity, gasoline, for example, which all motorists have to buy.

If you advertise that you sell something like gasoline, your advertising must emphasize service, or location, or price. The public is already sold on gasoline just as they are sold on sugar. The grocer does not have to advertise sugar because people would buy it anyway. Gasoline is the sugar of the garage trade.

Still, you might find it profitable to advertise gasoline in a certain way, because if you get the best gasoline trade of the town you will be able to make more profit on the gas and you will get the other business of many of the gasoline buyers.

In advertising gasoline, however, you will not tell what gasoline will do. You will tell what you do. You will advertise the fact that your pump is most conveniently located, or that you keep the pump tested so that you are sure of always delivering a full gallon for every gallon indicated on the register. You will advertise that no sediment can get through your pump and that your employes are instructed to use the utmost care in removing caps from gas tanks in order that sand or dust from the car will not get into the tank and perhaps choke the feed pipe.

Honesty Is An Asset.

You will call attention to the fact that in buying gas from your pump, there is no waste. You will state that your employes are instructed never to run over a tank, never to leave a pint or so in the hose, never to overcharge or undermeasure. Thus, you will show the user that even though he can buy his gas by the barrel cheaper than you can sell it, he probably does not save any money by doing so.

So, you see, there is something to advertise even about a thing like gasoline, and it may be made profitable to do that advertising.

In this advertising which is counted on to interest people in buying from your garage things they are going to buy anyway, you will emphasize the advantages of buying things of the particular make that you handle. It will be so in tires. You do not have to ask people to buy tires. You have to ask them to buy the kind of tires you sell. So also with oils and greases.

You may easily find it profitable to advertise well known makes of supplies which pay a smaller profit than some other things for the reason that advertising of such things counts double. It links your garage up with the advertising done by the manufacturer. It brings to you people who have been influenced already by the advertising of the manufacturer. It makes your advertising and his pull together and both will pull the stronger for the co-operation.

Advertising makes goods go faster, makes it possible to turn over your stock more frequently, and on that account it is good business to advertise lines that pay a small profit.

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The advertising you give unknown or nameless goods must pull harder in order to make sales. You have to convert your public at the outset.

If you have a stock of some device for helping make a Ford car easier to steer and it is not generally advertised



Back Up the Manufacturers' Advertisements with Your Own.

and your public know nothing about it, you have to show them that your device is something they want and need. You will have to educate them into the belief that it will do what you claim for it. You practically have to begin at the beginning. You get no help from the manufacturer because he has not brought the device into prominence.

Tires and gasoline probably sell on closer margin than almost anything else you handle. An off-hand guess would be that it would therefore be less profitable to advertise them than to advertise other goods. That is because the off-hand guess does not take account of rapidity of turnover, caused by the necessity for buying again and again as you sell out frequently.

Familiar Things Easily Sold.

Of course the things that people are using all the while are easier to advertise. It is easier to interest people in reading the advertising literature about them. Good advertising about things you sell every day will bring more business than advertising of the same quality about things you sell only now and then. A man will read tire advertising all the time because he wants tires frequently. He will pay little attention to battery or speedometer advertising after he has bought his new battery or new speedometer. He is out of the market and turns his attention to other things.

Limited Demand Factor.

There are some lines of goods which you cannot afford to advertise very extensively. For example, there are lines you carry, for which there is a very limited demand. The possible sale of these goods, even if all your prospective buyers of them purchased, would be very small. You will be able, if you look around your garage stock room to find items selling for perhaps a dollar each, the sale for which would never get above half a gross a year.

The sale of $72 worth of the goods, at retail, might bring you a gross profit of from $18 to $24. If that half-gross sales should represent just about the "saturation point" of annual sales effort, it is plain enough that it would be foolish to spend ten dollars in advertising that item, because the ten dollars would represent more than the net return on the whole deal. To spend ten dollars in raising the sales of an article enough to increase the net return five or eight dollars would not be good business. So, you see, there are certain items that are not worth much publicity expense, even though they may return a larger profit per sale than some quick-selling items.

Turnover is what makes profits and you will do well to concentrate on the kinds of goods that turn rapidly, in order to speed up the turnover.

To find the number of times your stock turns over in a year, divide the cost of the goods sold, not the aggregate sales, by the inventory value of the average stock. Fast turnover means doing a large business with a small stock, and that means frequent buying—keeping goods coming in all the while as well as going out all the while.

Knowing How Much to Advertise.

Knowing what to advertise involves knowing how much to advertise it. That is to say, many items which are not worth, in point of possible sales and profits, giving them a full advertising space talk, may be worth mentioning in one corner of your advertisement quite often. You can make up a big display advertisement for the newspaper telling about something worth large space, and without reducing the pulling power of that ad, you may use a little space in it to call attention to the little item of limited appeal.

A good many items that are not important enough for newspaper advertising are important enough for such advertising as you can give them in the windows and inside the garage by means of show cards, or through the distribution of folders, or by putting up fence signs along the highway.

One of the things garages do not advertise enough is service. Service is what people expect from you in return for the profit you charge on your goods. When you develop a special means of accommodating the motoring public, don't be too modest about letting the public find it out for themselves. Advertise the fact that you give certain accommodations. If you have free air, say so.



The Prospective Purchaser Must Be Shown—Show Him.

If you have a good rest room in your garage, mention it. If you make deliveries within a certain radius, advertise the fact.

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This service commodity is not a tangible and a concrete thing perhaps, but it is a thing very much appreciated. It is a thing people want and they are looking for the garage that gives it, and that garage is going to get their trade in actual commodities and it will indirectly reap a good profit on the investment in advertising it.

A part of service, or closely connected with it is the labor in your workshop. Do you ever give up your



Put Thought Into Your Advertisements, Don't Hold Them Until the Last Minute.

advertising space to telling about the technical ability of your working force. Take each man by himself, run his picture in your advertisement, tell what his training has been, just what his specialty is and what work he does. This kind of advertising will work in many ways. It will interest the friends of the workman, it will encourage the man himself, and of course it will interest people who are looking for the best mechanics.

Confidence in a garage is what brings the best class of trade; the trade of the men who own good cars and want them well treated. Patrons who want to be sure that the work they pay for, has been done. Advertise to create confidence in your shop, to make people believe in your honesty.

Labor Is a Commodity.

Labor may not bring the same direct profit that tires bring, or that the sale of a car brings, but it brings people back again and again for more work, and work means the sale of parts, accessories and supplies. Advertise the labor you employ and let people know that it is dependable. If you have more work than you can do, advertising may not be desirable, except that it might make it possible for you to pick and choose, eliminating a class of work that does not bring spot cash, or that does not help the general business as much.

When you plan your advertising, don't go about it haphazardly. Give every good feature about your garage its chance. Advertise first one thing, then another, and don't let your advertisements repeat. Go right along down the line on all the items you want to stimulate.

Make out a schedule in advance so that each week you know what to advertise, without having to rack your brain at the last minute for something to mention that time. Get up your advertisements ahead of time. The printer will be a better friend if you are the man who always gets his copy in early, instead of at the very last minute.

You can remember many times when you have sat at your desk, knowing you had to get up an advertisement, but wondering what in Sam Hill you could advertise that time. Advance plans will prevent this brain-racking at the very last minute, and the resulting "half-baked" advertisement.

Many garage men, who forehanded enough with their shop work and buying, are always behind with their advertising, partly because they dread the work and partly because they don't know what to advertise. Give your advertising more thought. Plan it farther ahead. Make it just as much a part of your routine work as making out pay checks. Then you will come to like the work, or at least to do it easily and much more successfully, and you never will be worried over what to advertise.

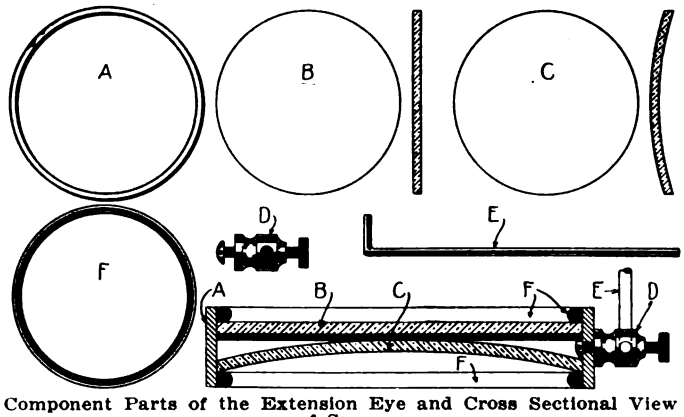
A HANDY GARAGE TOOL.

A Device That Figuratively Brings All of the Hidden and Inaccessible Parts of An Engine and Transmission Within Reach.

A GARAGEMAN who has been in the business for any length of time usually has some interesting ideas and short cuts for doing work, and it is interesting to go into garages which have repaired automobiles since they first came into use. Not long ago the writer was in such a garage and found a little device which seemed to be mighty interesting. This might be termed an "extension-eye" for the repair man. Manufacturers often jokingly remarked that some time they intend to build an automobile which has all of the small nuts, bolts and screws on the dashboard, and though such a thing is not possible, the repair man who designed the "extension-eye" about which we speak did the next best thing.

An Extension Eye.

This device was nothing more or less than two small mirrors about an inch and a half in diameter, mounted upon a long flexible wire. When the writer visited the garage the repair man was examining the wrist pin of



Component Parts of the Extension Eye and Cross Sectional View of Same.

an old Hupmobile engine. There was no way for the repair man to look directly at the wrist pin because the

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crank case opened at the side and a mirror was the only answer.

Upon closer examination the device was found to have two different sides, one side so fitted with a plain flat mirror while the other side was fitted with a concave mirror. The construction was simple and the cost but a few cents.

In the accompanying sketch is shown the combining parts and the mirror assembled. In making a device of this sort one should obtain first a large watch crystal, the largest obtainable, and have it silvered at some mirror manufacturer's, or at any small shop where mirror silvering is done. One should then obtain a brass ring or tube slightly larger than the crystal and cut it about an inch in length as shown in A. Around the inside edge of this arm should be soldered a piece of copper or iron wire and the mirror C put into place. In the side of the ring at D should be fastened a binding post, such as is used for electrical apparatus and this binding post should be soldered to the ring. Be sure that it is soldered tightly, or sooner or later it will unscrew from the ring and cause trouble.

With the binding post in place a piece of cardboard should be placed on top of the concave mirror and a flat mirror B may be placed in the ring. The flat mirror may be cut from any ordinary plate mirror with a glass cutter. After this has been put in place the ring F should be sprung into the brass rim. A little careful hammering of the rim bends it over and retains the ring F in place. The handle E should be made from a piece of soft iron wire such as is used for telegraph lines and may be of any length to suit the repair man.

With a device of this sort the interior mechanism of the engine may be examined, the transmission may be looked into and frequently the repair work on the undersides of the units may be done without crawling beneath the car. The concave mirror will magnify parts at the same time that it reflects and comes in very handy for looking at the back of the ignition unit or coil.

Manufacturing Methods, the Care and Repair of Automobile Springs

Those Steel "Shock Absorbers" Which Prevent the Racking of the Car Body and the Passengers Need Constant Attention

BY M. J. HENNESSY, M. E.

SPRINGS are attached to a vehicle so as to impart resiliency thereto, that is what they are primarily intended for, and sometimes they are used for that purpose. Often they are used to make the night hideous with squeaks and groans which I need not try to describe, as you are doubtless quite familiar with them. Again, they are used to loosen all the nuts and bolts in the car and to jar the suffering passenger loose from his thoughts, or anything else he may have, including his money, if he happens to be the one who pays the bills.

A motor car spring is made up of a series of leaves or plates which are set one on top of the other. As long as the surfaces are free from rust or grit, and are lubricated, some way or another one *has* a spring, but when once the rust gets in and acquires a firm footing, then one *had* a spring.

Springs are made from a specially prepared steel, the ingredients of which vary according to the formula of the maker, or with the specifications of the car builder for whom they are being prepared. As the formulae are so many and varied I will not attempt to give an analysis of the stock, but will try to describe the process of making the spring itself.

Making the Spring.

The steel is first cut to the required lengths. It is then shaped on the flat. The top leaf, main leaf or leader, as it is variously called, is the most important. This plate is invariably of a parallel thickness, while the under leaves, or followers, taper toward the ends. The main leaf having been cut to the proper length, is rolled or forged at the ends to form the "eyes," into which are fitted the shackle bolt or shackle bolt bushings, as the case may be. The side view of the main leaf at this stage is shown in Figure 1 at A. In some cases, particularly on trucks, the second leaf is extended and wrapped around the eye of the main leaf as shown in Figure 1 at B. This is what is called the Double Wrapped Eye.

In still other cases, the second and third leaves as

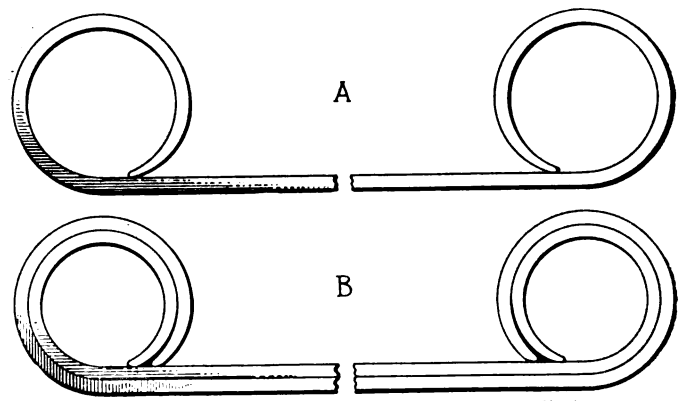


Fig. 1.—Two Steps in the Manufacture of a Spring.

well as the first, have a shackle bolt eye, in each of which is a separate shackle bolt. This is called the Triple eye shackle and is shown in Figure 2. It is, as far as I

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know, only used on trucks where there are no torsion rods employed. It is used only on the forward end of the rear springs.

The under leaves or followers are now forged out so that they may have the correct thickness tapering from

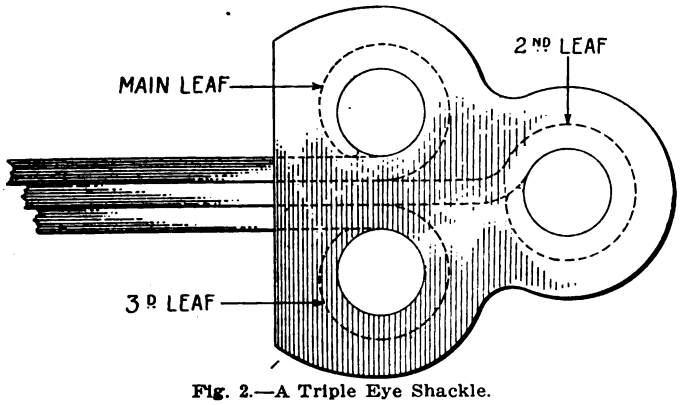


Fig. 2.—A Triple Eye Shackle.

the center toward both ends, then the ends are rounded.

The next operation is the placing of the bolt hole, if the spring is to have a center bolt. As nearly all the work which is done on this kind of steel is done while it is red hot, this hole is put in with a punch. Manufacturers are fast eliminating this method of construction, however, in favor of the dowel and slot arrangement.

Advantage of the Center Bolt.

The only advantage of the center bolt is that it keeps the spring in place on the axle and keeps the leaves lined up. The grave disadvantage of it lies in the fact that it weakens the spring and renders it more liable to breakage. The dowel system accomplishes all the results of the center bolt and has none of its disadvantages. The spring is now ready for its final shape which it receives in the following manner:

A form is provided which has the exact curve required for the new spring. This form is placed on a stand convenient to the forge. Figure 3 gives an idea of the stand and form in general use. The main leaf, which has been heated to a very bright red heat is now laid on the form and pinched down by means of tongs until it lies right on the form, touching at every point. This process is repeated with all the other leaves, each leaf being used as a form for its follower, until the spring is complete.

The spring is now ready for its final tempering, and here again the processes are so diverse and so many that no attempt will be made to describe them. It is sufficient to say that the great majority of manufacturers are continually trying to improve their product and it is no more than fair to say that when one gets a set of American-made springs in his car he has a set of the best springs obtainable and it is well within his power to keep them that way.

Lubrication Is Important.

The first and most important item in spring maintenance are the shackles, shackle bolts and bushings. Everyone who has had any experience with machinery of any kind must realize the importance of having a moving part work easily in its bearing, and yet it is no uncommon thing to see a man take a "young" sledge hammer and drive a shackle bolt home as if it would never need be removed again. Remember in putting these parts together it is just as important to have them work easily and smoothly in their bearings as it is to have oil in the engine.

The bolt should be tight in the shackle but it must be a bearing fit in the spring. A properly fitted spring bolt will feel to the hand about the same as a wrist pin; that is, when the bolt is oiled it should just slide through the bushing; there should be no side play nor should it rock in any direction and the bearing surfaces should be as smooth as they can be made. Before the bolt is put into place it is absolutely necessary to have the three holes in perfect alignment.

If, in order to pass the bolt through shackle and spring, it is necessary to take a four-foot monkey wrench or a huge bending iron and apply a twisting strain to the spring there is something wrong and it is best to find out what the trouble is before going any further. Every man who has attached springs to an automobile knows that the easiest way to do the job is to first attach the spring to the shackles and then fasten the spring to the axles, but in this case the easy way is the wrong way because when the spring clips are pulled down there is no way of telling what one is doing to the shackle bolts and by the time a heavy rear spring has been pulled down to its seat the shackle bolts may be pulled a sixteenth of an inch or more out of parallel.

Use Care in Fitting.

If one wants to get the best results, first set the spring on the axle, examine it carefully and see that it hugs the seat closely and touches at all points. If there is any space showing between the two surfaces don't try to make them fit with a file but insert a piece of leather, the same length as the spring seat, and no wider than the spring. Make a hole in the center, a trifle larger than

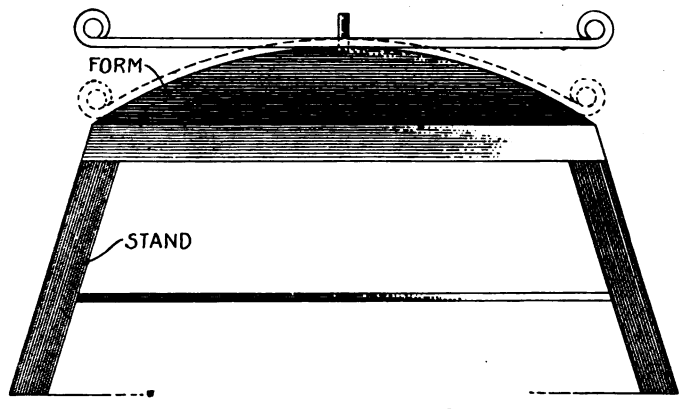


Fig. 3.—The Forming Bench and Forming Iron.

the hole in the spring seat; have the leather thin enough so that the butt of the center bolt, or the knob on the bottom leaf, as the case may be, will project far enough to fit snugly into the hole in the seat.

Unless there is a marked difference in the curves of

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the seat and the spring a very thin piece of leather will do as well as if it were a half inch thick. Having made sure that there is a perfect seat for the spring you can lighten the work a little by taking two pieces of stock or two bolts which are smaller in diameter than the right bolts, and hang up the spring to the shackles. Then put on the clips and in tightening up spring clips don't be afraid to put a little "beef" to the wrench. *Make them tight.* The spring is now ready for the shackle bolts. Take the stationary one first. At this stage it may be necessary to pry the axle in one direction or another. It is permissible to pry or force the spring in any direction but one—*don't twist it.* A good way to exert pressure on a spring is to take a small heavy "C" clamp, attach it to the spring with the screw toward the ground, pass a bar through the clamp so that the end of the bar will reach the frame of the car, or the spring itself, and in this way one can coax the most stubborn spring into place.

Use Plenty of Oil.

Having lined up the spring in the forward or stationary shackle, oil the bolt thoroughly and slip it into place. Then repeat the process with the rear or swinging shackle. One will seldom, if ever, have any trouble putting in this bolt. It is only necessary to bear down on the spring until the holes line up and the bolt will go right into place. If it appears as though the spring must be twisted to get the bolt in, and the spring has a good solid seat on the axle, the cause is one of two—either the main leaf is twisted or one of the shackles is out of line. The correct line for every shackle bolt is exactly ninety degrees to a line drawn through the center of the chassis. There should be but little difficulty in correcting the trouble if it exists.

Care should also be taken to see that the nut on the shackle bolt is not pulled up so tightly that the shackle pinches the spring. For this reason it is poor policy to use lockwashers on these bolts as a lockwasher to be efficient has to be pulled up so tightly that it is bound to pinch the spring.

It sometimes happens that one who is inexperienced will take all the springs out of a car without noticing just how they came out. When he starts to replace them he notices that the springs have a long and a short end. That is where he begins to scratch his head and wonder. The invariable rule for this type of spring is—the long end to the center of the car; that is, the long end of the front spring to the rear and the long end of the rear spring to the front.

Remove All Rust.

Should you take your car springs apart and find them coated with rust, take a light hammer and beat each leaf lightly until the rust falls off. You might use a ream of emery cloth or sandpaper and not get anything like the results attainable with a couple of hours effort with a hammer. When each leaf is clean and free from rust take a mixture of Dixon's graphite and any kind of slush grease that is handy and coat each leaf thoroughly. The grease is used simply to keep the ghaphite where it belongs. In the opinion of the writer, graphite is the only real spring lubricant and the more of it you can get between your spring leaves the better for the springs and your comfort.

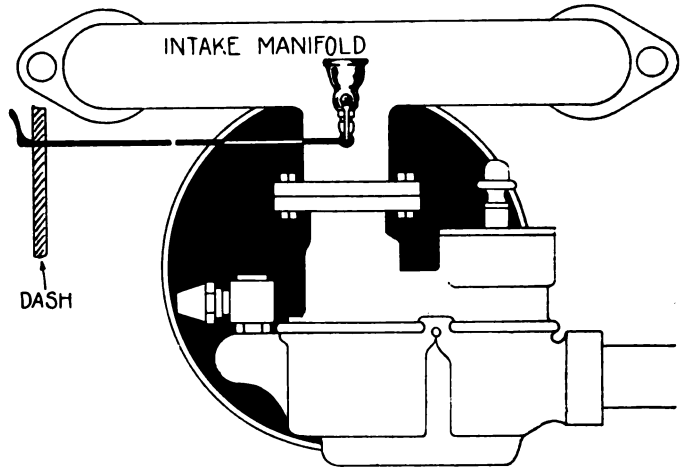
It is not necessary to have the springs out of the car to grease them. One can buy an inexpensive tool which is shaped something like a "C" clamp, having two wedge shaped jaws instead of the conventional flat faces of a clamp. By loosening up the spring clips and inserting this tool between the leaves there will be plenty of room to introduce the lubricant by means of a thin knife or any other means at hand.

Don't try to spread the leaves of a spring without loosening the axle clips and the center bolt, if there is one, and taking some of the weight of the car off the spring by means of a jack under the frame. Do not drive a screwdriver or chisel between the leaves. It is much cheaper to buy a spring leaf separator than it is to buy new springs.

USING AIR AS A FUEL.

Now That Gasoline Is Scarce and Its Price Is Soaring Toward the Skies Efficiency Should Be Our Watchword.

IN these days of high prices the motorist emits a groan every time he reaches for his pocketbook to pay for gasoline, consequently he should be interested in any device for saving fuel.



Petcock Installed In Intake Manifold.

Few motorists realize that the older types of carburetors do not work efficiently with present-day fuels. Consequently some of the fuel escapes combustion and is driven through the manifold. The reason for this is that the fuel is not properly vaporized and mixes with a sufficient quantity of air so that the question immediately comes up, "why not burn air instead of gasoline?"

At low engine speeds a certain amount of air is required in proportion to the gasoline but as the engine speed increases more air and less gasoline in proportion are required. Few carburetors, however, of the old style, accomplish this, and the motorist will find that by installing a petcock in the intake manifold as shown in

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the accompanying illustration, he will be able to save considerable fuel. This petcock should be connected by a wire to a handle mounted upon the dashboard.

After the engine has been started and the car is traveling more than fifteen miles an hour, this petcock may be opened, admitting more air and decreasing the vacuum so that less gasoline will be used. As the engine slows down, however, unless the petcock is closed, the mixture will be too lean. Some motorists connect the petcock handle with the gasoline or spark lever, so that when one of these levers is retarded less air is admitted. After a few experiments the motorist will be able to adjust this very easily and thereby increase the car mileage per gallon of gasoline.

The Actual Experience of a Family of Westerners With Tractors

The Owner of Mules Was an Expert At Handling The "Long-Ears" But the Bray of the Animals Couldn't Match The Tractor's Exhaust.

OUT in the Far West is a family of prosperous farmers who are also experts at breeding and handling mules—the Ryans, of Merced, California; father and two sons. For years their lands and their livestock have been the pride of the district, and it is commonly accepted that what "old man Ryan" and "Jim" and "Bob" don't know about mule-flesh isn't likely to be picked up anywhere else.

The elder Ryan has farmed by mule-power for many years, and has made it pay. The brothers followed the same course for some time; then as power farming began to take hold as a big, practical, coming thing, they commenced to "think tractor" a little.

Not openly at first, of course; in such a family as theirs, that would have been almost equal to treason; but, being astute business men, they began to wonder eventually whether, after all, the mules were quite such ideal farm-power as they had been brought up to believe.

Finally, almost at the risk of breaking his father's heart, James Ryan ordered a tractor—a "Caterpillar," made by The Holt Manufacturing Company, of Peoria, Illinois, and Stockton, California. Traveling upon its endless tracks instead of on wheels, this machine looked strange enough to the elder Ryan and his neighbors.

Fighting the Rest of the Family.

But even a few years ago, the remarkable ability of the "Caterpillar" to pull huge loads, and to run easily over soft ground where wheel tractors might mire hopelessly, had won it fame and favor. To all appearances, two-thirds of the Ryan family were lined up solidly against the move and predicted financial loss—but James Ryan had made the plunge and was prepared to see it through.

The "Caterpillar" arrived a little before harvest, and by the time it was limbered up, the Ryan grain was ready to be cut. To handle a large acreage, two combined harvesters had been bought. They were identical in every way—size, model, and width of cut.

"Bring on your 'Caterpillar,'" said Robert Ryan as he harnessed up his best mules one fine morning. "I'm going to show you up before noon." The tractor-wise brother said little, but turned up on the dot, with his outfit all set and primed to give the "long-ears" a run for their money.

Off they went at the crack of the lash in one field and the pop of the motor exhaust in the other. Everyone who has seen a "Caterpillar" Tractor at work can appreciate just what keen rivalry that morning's contest developed. This machine lays down its tracks in front and picks them up again at the back, with a fascinating precision and regularity; and it certainly ran true to form that morning.

The Tractor Gains a Lap.

Round and round the field they went, the motor hitting steadily and the tractor drawing always a little farther ahead until, despite the whip, the mules had been left a full lap behind. Then Robert Ryan gave the grand hailing sign of distress. "You win," he conceded—and the "Caterpillar" came into its own at Merced.

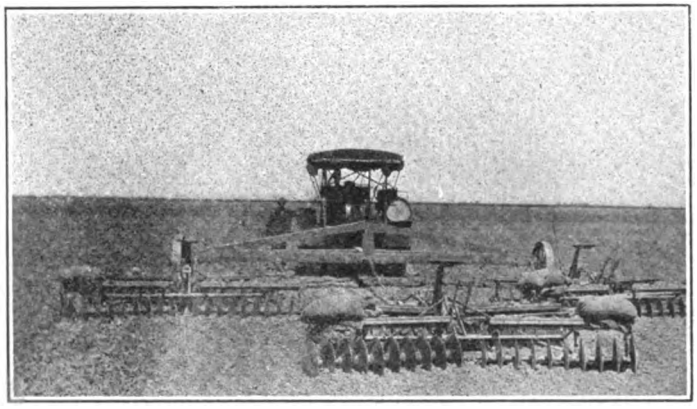
With its standing thus established in the "enemy's camp," the outfit continued its good showing through the season. Then, concluding that a larger model was needed, James Ryan ordered another—a "Caterpillar-Seventy-Five." When that reached Merced, Robert Ryan's last doubt vanished, and he began to study the "Mules Wanted" section of the classified ads. He found a buyer—and soon the Holt people had a duplicate order to fill.

With this abundance of mechanical power on the Ryan Ranch, things began to move with even more vim, and the brothers found themselves with time to spare. "Teamwork" is the slogan of the Ryan family; so when the brothers, working together, were caught up with the plowing on the home plate, they began together to look around for outside jobs.

They found them; lots of them, for the neighborhood was "under-powered"—trying to do a big plowing, cultivating and harvesting job with insufficient facilities. Those two "Caterpillars" snapped up big plowing contracts as a frog snaps up flies; and the acreage they could turn was a nine-days' wonder to the whole community.

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A few miles from Merced is a ranch that lies mainly "up-and-down." The owner farms the hills successfully, but he hires his plowing. He heard the Ryans were



Double Discing a Forty Foot Strip in the San Joaquin Valley with the Holt "75."

doing some real work, and invited them to come over and figure on the job.

Thinking a little competition might help, he called in a professional plowing contractor, also. This man started out from town in his little roadster to look the ground over. His car—one of a make that's generally supposed to be able to go anywhere and back—stalled on the very hills he would have had to plow. "Good *Night!*" he observed with deep feeling, as he turned back toward Merced.

The Ryans got the contract.

When they arrived ready for work, the ranchman was surprised to notice that each of the "Caterpillars" had a headlight. "We're going to work nights," the Ryans explained—and they did. For more than three weeks, those steep slopes hardly ceased echoing to the double roar of that "Caterpillar" team.

Doing Two Things At Once.

Each tractor pulled 140 inches of moldboard plows, running six inches deep; and hitched on behind the plows, a set of harrows; so the ground was broken and prepared for seeding at one round.

The actual working time was 23 days and 23 nights and the average length of each shift was 10½ hours. When the dawn broke on the twenty-fourth day, the outfits had two thousand acres to their credit—and the job was done. That meant that each tractor had broken and harrowed an average of more than 43 acres a day of 21 hours—over two acres an hour.

During the entire run, the fuel consumption of each tractor per 21 hours averaged only 35 gallons of distillate—a fuel which is generally inferior to good gasoline and costs somewhat less. The entire fuel bill for both tractors was only $218, and the lubricating oil consumption was very moderate, also—85 gallons supplied the two outfits over the entire contract. The customer was well pleased—and so were the Ryans themselves, for it gave them additional proof of what the "Caterpillar" could do.

Even so, the job wasn't wholly devoid of adventure. Late one afternoon, one of the brothers started to lay out a piece of plowing for the night crew. The custom was to plow a single furrow clear around the tract as a guide; then the operator could easily follow the lead after dark until he had made the round trip once or twice. After that, his work would, of course, be much easier.

A Narrow Escape.

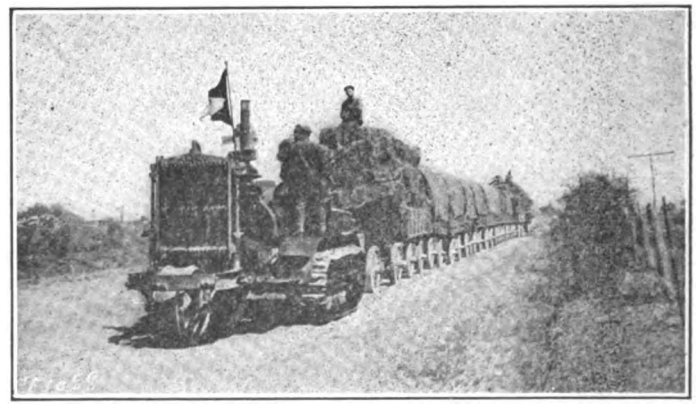
At one point, the hillside dropped abruptly; to avoid this, the guide furrow made a sharp turn and followed a more gradual slope. Robert Ryan was plowing that night, and in making the first round he failed to follow this turn. A little later, feeling a sharp lurch, he stopped the tractor and walked forward to investigate. Imagine his feelings upon discovering the whole outfit balanced daintily upon the very edge of the cliff, with the forward part actually hanging out in space!

"I uncoupled in a hurry, backed to safety, drew a long breath and mopped my face," remarked Mr. Ryan in telling it. "But where would I be now if I had been driving a wheel tractor?"

The Ryan brothers have become attached to their outfits for various reasons just as practical as this one—that the tractor didn't coast down hill to ruin when it had the chance. Their satisfaction with both machines is all the greater because each of the brothers made his choice with great care—considering first the merits of wheel tractors against "crawlers," and then measuring and comparing the claims of the various types of the latter.

Their selection of the "Caterpillar," made from purely business motives, was probably not intended as an indorsement of the fact that Benjamin Holt was the first inventor to apply the endless track in a practical way to farm tractors; nor that his machine was—and is—the only one legally entitled to use the name "Caterpillar."

To the Ryans, these matters were purely incidental; but in buying "Caterpillar" tractors, they profited largely



The "Caterpillar" Tractor with the U. S. Army on the Border. These Machines Hauled Loads As Great As 50 Tons Over the Road.

by the many exclusive features built into the Holt product, and those qualities have enabled them to make handsome profits. And that *is* an object.

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Occasionally the brothers were able to play tricks on their customers—of the kind that both parties could enjoy. One of these involved the cook at the ranch-house where their crews were to board while putting through a plowing contract of some hundred acres.

A Saving in Food.

On this ranch the plowing had always been done by horses—four or five teams working six weeks or so. The owners forgot that there might be a difference between horsepower and tractor power, so plans were made to board the crews for a long period. The Ryans and their men enjoyed that ranchman's hospitality for just one day more than a week; then they moved on with the plowing finished—all done to the well-known queen's taste—850 acres in eight days and eight nights.

Never for a moment, though, even at the height of these showy records, have the Ryans forgotten the needs of the old home place. Those came first; the only tractor-time that they sell is the surplus that remains when the home fields are tended.

In the season of 1916, for instance, James Ryan harvested 1,700 acres of grain with his tractor, pulling a 25 foot ground drive harvester. For nine consecutive days he cut 50 acres per day of eleven hours. On the whole job, the fuel consumption averaged only 35 gallons per 11 hours.

But someone may raise the point that the conditions that these men met and settled so fully are extreme ones; or that, while typical of the Far West, they have no counter-part in the East; or that very few Eastern farmers work upon any such scale as this.

The answer is that, in the main, the experience of the Ryan brothers will fit the case of the great majority of farmers who realize that there must be a more economical and efficient form of power than they will ever be able to get from horses. It will, of course, be necessary for one man to magnify the scale upon which the work is done, and for another to figure it on the "miniature" plan—but the principle is the same, either way.

Tractors Made in Many Sizes.

Of course nobody would advise a man with a small acreage to buy a tractor big enough to pull 16 plows, any more than the owner of a big place should be counseled to order an "8-16" or a "10-20" just because it loked nice. The tractor manufacturers have figured that out carefully, and many of them build a range of sizes. It's as much to their interest as it is to the buyer's to put the right machine into the job; and most of them can be depended upon to render a sincere service in fitting the tractor to the work it is to do.

The one outstanding lesson here—the one which most readers can apply personally—is the absolute frankness and open-mindedness with which Mr. Ryan approached the question when he first began to doubt the value of animal power.

He became convinced that mules were not the last word; from there he and his brother progressed to the point of applying thorough-doing methods—profitable methods—to the business of farming.

The difference between their case and that of hundreds of other men's is, we believe, one of size rather than of character.



Holt Tractor Plowing Tule Marsh Land in California. Reeds Are From Ten to Fifteen Feet Tall and Are Plowed Down and Rolled In As the First Step in Making the Land Fit For Cultivation.

EDITOR'S NOTE.—This is the first article of a series of stories which will be published from time to time and is published to show that there are many arguments in favor of the farm tractor. Every dealer should investigate tractors and make arragnements to sell them for undoubtedly there will be much money in this branch of the trade.

NAVY NEEDS GAS ENGINE MEN.

At Least One Thousand Men Familiar With Engine Work Are Wanted At Once.

THE Naval Reserve force must enroll at once 1,000 men, experienced in the operation and maintenance of gasoline engines. This is an urgent call. The men are required for immediate duty. They will be rated as machinists' mates.

Age limits are eighteen to thirty-five inclusive. Applicants must be American citizens. Draft registrants with letters from their local boards will be accepted.

Apply at Naval Reserve Enrolling Office, 51 Chambers Street, New York, or any navy recruiting station.

TRUMAN H. NEWBERRY,
By direction
Assistant to Commandant.

Natural Deduction.

Mrs. Much—"What dreadful language your parrot uses!"

Mrs. Nothing—"Yes, my husband bought the bird one day and brought it home in his car, and I have always suspected that he had engine trouble on that trip."—Milestones.

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The A B C of Modern Magnetos and Electric Generating Systems

Part 1—The Electric System, Particularly the Generator, Is the Heart of the Automobile and Should Be Understood Thoroughly

BY A. P. PALMER, E. E.

WHEN a coil of wire passes around a piece of soft iron and an electric current flows through it the iron is magnetized and if the iron core be circular in form a magnetic circuit will be formed. The intensity of this magnetization is determined by the number of lines of force per square inch. This is called an electro magnet and if the electrical circuit is broken the iron core will be demagnetized. The strength of the magnetization will depend on the number of turns of wire and on the strength of the current. Steel is used in all cases where permanent magnets are desired but soft iron where a variable magnetization is required. If the iron core used be in the shape of a horseshoe it will be found that one end is a north pole and the other a south pole. A north pole of one magnet will attract the south pole of another and will repel the north pole of the second magnet. The presence of a magnetic field may be shown by placing a piece of paper across the two ends of the magnet and sprinkling iron filings across the paper. These filings will immediately arrange themselves in lines extending from one pole to the other showing the presence of the magnetic lines of force, as in Fig. 1.

A piece of metal that retains its magnetism after being removed from the magnetic circuit is called a permanent magnet.

Current Generation Law.

Now if an insulated coil of wire with an electric current passing through it will produce magnetism in an iron bar inserted in the coil, by reversing this process the magnetism will produce a current in the coil. In other words, if a conductor be passed through a magnetic field

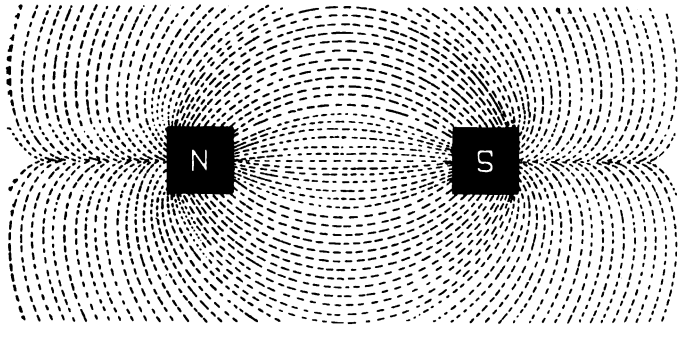


Fig. 1.—Showing the Lines of Force From a Horseshoe Magnet.

the cutting of the lines of force induces an electric current in the conductor.

In a magneto, the armature revolves in a field produced by permanent magnets while in a generator electro magnets are used. Where the device is depended upon, only to furnish ignition current, most engineers prefer the magneto because it is simpler and lighter than the dynamo. However, where a starting and lighting system is required a storage battery is necessary and for charging this a generator is preferable as direct current is required. In a generator each coil on the armature as it passes through the magnetic field, first one way and then the other, produces an alternating current. Now if the

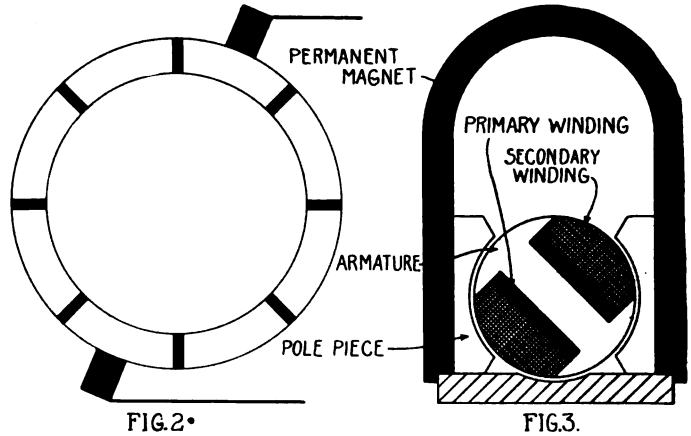


Fig. 2.—Commutator and Brushes; Fig. 3.—Section of Typical Magneto.

ends of the coil can be reversed as the current reverses, a direct current will be obtained. For this purpose a commutator is used, consisting of a number of segments in circular form (Fig. 2) insulated from each other and with which two carbon brushes diametrically opposite are in contact. The opposite ends of each coil on the armature are connected to opposite segments on the commutator.

Magneto Construction.

The magneto shown in Fig. 3 consists of two horseshoe permanent magnets, compound in form and to which are fastened two pole pieces, between which the armature rotates. Upon the armature core are two windings, a primary composed of a few turns of large wire and the secondary, a good many turns of fine wire.

The primary coil will deliver a current of small voltage but relatively large amperage while the secondary current is small but of high voltage. The current is alternating in character and the break in the circuit should occur when the armature is at the point where the greatest number of lines of force are out.

When the break in the primary circuit is made by means of a cam a current of high voltage is induced in the secondary winding and passes through a distributor to the spark plugs.

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The distributor consists of an insulator in which are placed a number of segments, one for each cylinder to be fired, and so spaced that the number of degrees between them correspond to the ignition points of the motor.

Direct current generators are of different types depending upon the way in which the fields are connected.

1. When the current runs from the armature around the fields and then into the outside circuit the machine is called a series generator.

2. When a part of the current goes from the armature around the fields and the balance into the outside circuit, the machine is a shunt generator.

3. When two windings are used, a shunt and a series, the machine is a compound generator. The shunt winding provides an initial excitation sufficient to generate voltage at no load. As the load increases the current in the series field increases and prevents the voltage from dropping (Fig. 4). In a shunt wound machine the voltage is regulated by a variable resistance in the field circuit.

Electrical Units.

The unit of current, the ampere, is that amount which when evenly passed through a specified solution of nitrate of silver in water deposits silver at the rate of .001118 gram per second.

The unit of resistance, the ohm, is a column of pure mercury at 0° C. of uniform cross section 106.3 centimeters long, and 14.4521 grammes in weight.

The unit of electromotive force, the volt is $\frac{1000}{1434}$ the E. M. F. of a Clark cell at 15° C.

The volt is the electromotive force which will cause one ampere to flow through one ohm resistance.

The watt is the unit of power and is represented by a current of one ampere under a pressure of one volt.

Electrical Measuring Instruments.

For testing the strength of current flow in a circuit, an ammeter is used and for testing the difference of potential across two terminals a voltmeter. In an ammeter, part of the current passes through a shunt and the coil is of low resistance, while in a voltmeter the coil is of high

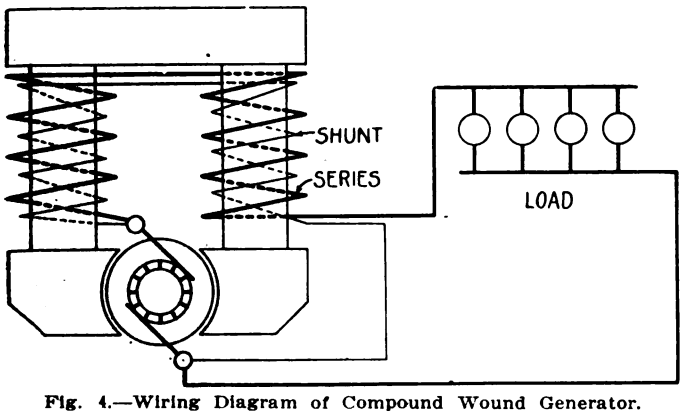


Fig. 4.—Wiring Diagram of Compound Wound Generator.

resistance and is connected directly across the terminals.

The instrument shown in Fig. 5 is the common type used. A coil of wire is wound on an armature of soft iron suspended on bearings between the poles of a permanent magnet. When no current is flowing through the coil the spring keeps the indicator needle at zero. As soon as current passes, however, a field is established and the armature being attracted by the field of the per-

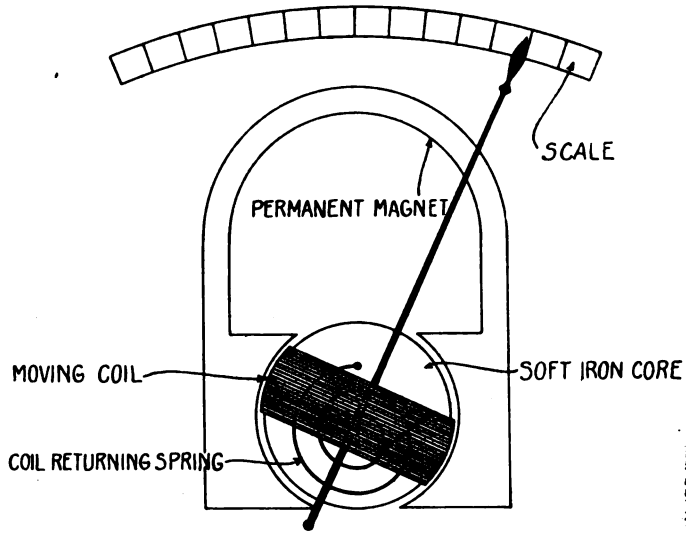


Fig. 5.—Illustrating Construction of Ammeter.

manent magnet turns and the needle indicates the deflection which is calibrated to indicate the amperes in the circuit.

The generator, used in starting and lighting systems, is used for producing current and varies in construction according to the system used. Some have an excited field while others have a permanent magnetic field. In the latter case permanent magnets are used, as in the magneto. In the other construction the field magnets, as well as the armature, are wound with coils of wire. In all cases the dynamo or generator should be mechanically driven from the engine crankshaft either by means of a direct drive by silent chain or through the medium of the timing gears. Belts are apt to break or slip.

In order to prevent excessive charging of the storage battery at high speeds a regulator is necessary, otherwise the voltage would rise so high as to cause a big inrush of current into the battery.

The electrical system of governing does not affect the speed of the armature, but accomplishes its purpose by means of a series field, armature reaction or by weakening the magnetic field. Ten to twelve amperes output is usually permissible in a generator.

Reverse Series Control.

The reverse series field control is accomplished by means of a compound winding (Fig. 6). The battery charging current passes through the series winding in such direction that any increase in the battery charging current tends to reduce the voltage generated, so that the battery is never charged at an excessive rate. When the lights are burning, however, current flows through this series, winding in the reverse direction, increasing the output of the generator and causing it to assist the battery in carrying the load. With the usual lamp equipment this increase in generator output is sufficient to operate the lamps without any demand on the battery

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at ordinary operating speeds. At low speeds the battery supplies a certain proportion of the lighting current and when the engine is idle the battery supplies the entire demand.

The generators with automatic potential regulators maintain constant voltage regardless of whether the battery is connected to the system or not. The battery charging current tapers off as the battery charge increases,

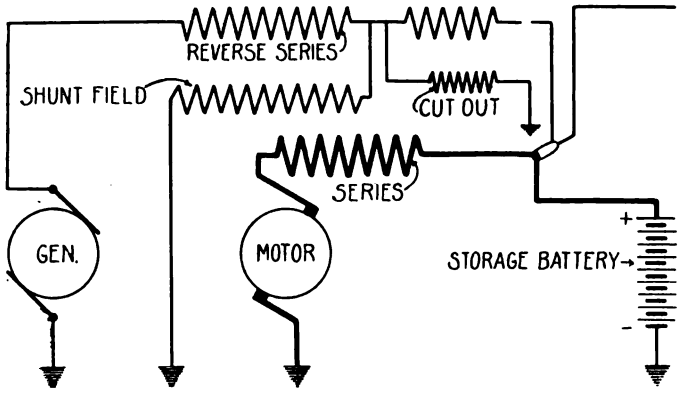


Fig. 6.—Wiring Diagram of Reverse Series Wound Generator.

being very large when the battery is in a discharged condition and of low value when the battery is fully charged. The voltage is independent of the speed and the amount of lighting load. The regulator consists of a vibrating armature that intermittently short-circuits a high resistance in series with the shunt field winding of the generator, the length of the short circuit period depending on the load on the generator.

Mercury Well Regulator.

Regulation on these systems was originally obtained by what is known as the mercury tube type of voltage regulator. It consists of a coil of wire surrounding a mercury tube, consisting of a hollow cylinder of german silver, lined with insulating varnish, and having two pools of mercury inside, separated from each other by an insulating cylinder of bakelite. The steel plunger which is also hollow moves up and down in the tube. The plunger itself moves in the outer well and the long steel needle moves in the inner pool of mercury. The two pools are connected by means of the resistance wound on the lower portion of the steel plunger, this resistance wire being insulated from the plunger by means of sheet mica insulation. One end of the resistance wire is connected to the needle and the other to the steel tube.

Now any portion of the resistance wire that is above the surface of the mercury will be inserted in the shunt field circuit. One terminal of the shunt field of the motor generator is connected to the bottom terminal of the mercury tube and the outer cylinder of the tube is grounded to the apparatus so that the shunt field is grounded through the mercury tube to the base of the apparatus box and thence, excepting during the cranking operation, to the frame of the car. The tube, the plunger and the coil of wire are all calculated so as to hold the voltage within certain limits.

Whenever the voltage of the motor generator rises above this value, the attraction of the coil for the steel plunger causes the latter to rise in the tube, thus inserting more resistance between the two pools of mercury and hence in the shunt field circuit, which in turn weakens the shunt field and causes the voltage of the generator to be reduced. This action continues until the voltage of the generator assumes a steady value.

Third Brush Regulation.

The motor-generator consists essentially of an iron frame and a field coil with two windings for magnetizing this frame. The armature which is the revolving element has wound in slots on its iron core a motor winding and a generator winding connected to corresponding commutators. Each commutator has a corresponding set of brushes which are for the purpose of collecting current from or delivering current to the armature windings while the armature is revolving. The current flowing into the motor windings from the storage battery turns the armature and starts the engine. When the engine is started current flows from the generator windings to charge the battery. The regulation is illustrated in Fig. 7. The full voltage of the generator is obtained from the large brushes "C. and D." When the magnetic field from the pole pieces N and S is not disturbed by any other influence each coil is generating uniformly as it passes under the pole pieces. The voltage from one commutator bar to the next one is practically uniform around the commutator. Therefore, the voltage from brush C to brush E is about 5 volts when the total voltage from brush C to D is 6½ volts and 5 volts is applied to the shunt field winding. This 5 volts is sufficient to cause approximately 1¼ amperes to flow in the shunt field winding. As the speed of the generator is increased the voltage increases, causing the current to be charged to the storage battery. This charging current flows through the armature winding, producing a magnetic effect in the direction of the arrow B. This neutralizes part of

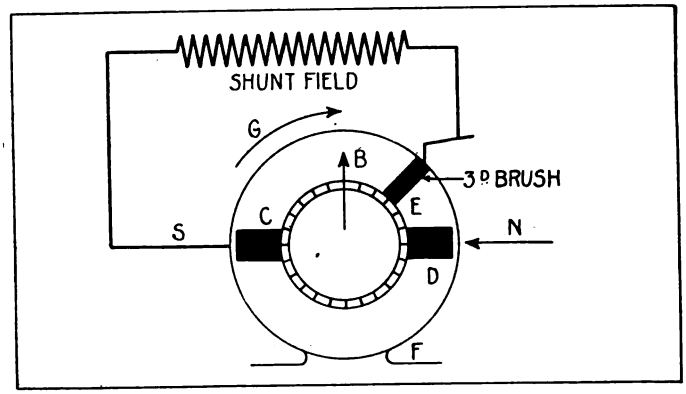


Fig. 7.—Wiring of Third Brush Regulated Generator.

the field and decreases the voltage generated from C to E, thus decreasing the shunt field current and regulating the terminal voltage.

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Attracting the Attention of the Passing Crowd to Your Window

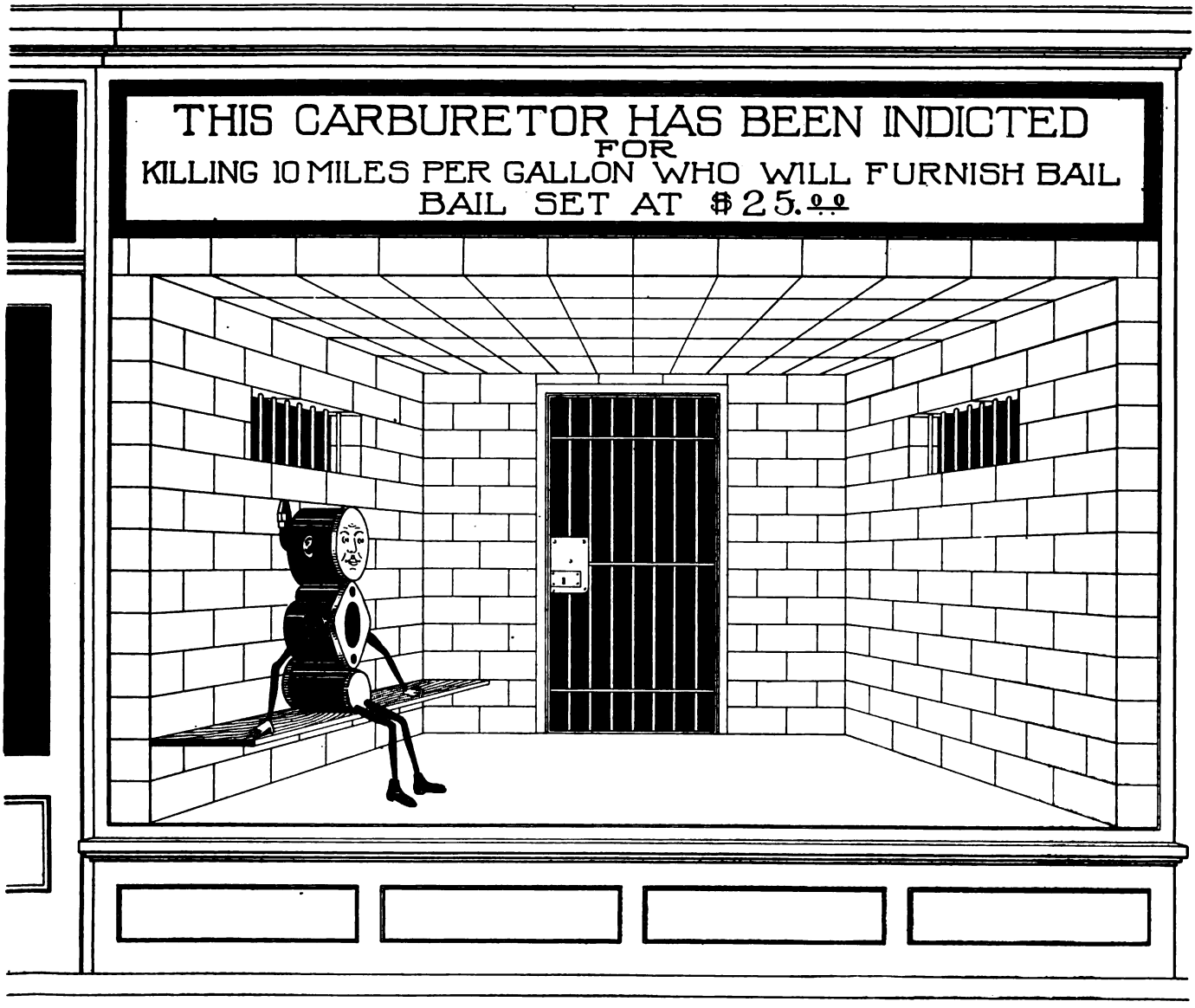
If You Have a Show Window, Make It Act As a Silent Salesman, Trim It So That It Will Appeal to Every Person Who Sees It and So That It Will Advance A Strong Argument in Favor of Your Goods.

WINDOW displays may be divided, roughly, into two classes, those which attract attention because they are different and those which attract attention because they are artistic. The accessory store may use either the one or the other advantageously, but of the two the former is usually most effective.

A long time ago, window dressers discovered the fact that crowds always gathered around moving objects, and for a long time every up-to-date merchant had some sort of moving object in his window, even in the small country stores one might often see a play-card in the window hanging upon a string. Occasionally the play-card would make a trip to the top of the window and back again and there were always a few people waiting around to see the reason for it. Usually the crudest sort of a device was used. The twine upon which the sign hung might be attached to the door and every person who passed through the door furnished the motive power.

Modern Window Dressing.

To-day, however, this idea has gone out of style and



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the merchant attracts attention by the uniqueness of his display. If he can get some particular idea in window dressing; something that will bring a question in the mind of the beholder, he can attract a crowd. Herewith is shown an exhibit of this type and to dress the window as shown in the picture but little time or money is required. It is bound to attract attention, and it not only brings a question to the mind of the person who sees it, but brings home an argument in favor of the device being exhibited.

In this particular case, the merchant desired to attract the attention of the public to a certain type of carburetor, which he was marketing at the time. He borrowed an automobile which was equipped with a standard form of carburetor and ran the car, in the presence of witnesses, over a measured course. Then he equipped the car with one of his carburetors and drove it for the same course keeping an accurate account of the gasoline consumed in both cases. He found that with his carburetor he obtained ten miles more per gallon upon that particular car and so he used this fact to advertise.

He took his show window and boxed it off to represent a prison cell, painting cloth to represent the stone walls and the openings. Upon one side he built a bench and upon it placed a large pasteboard model of the carburetor. Upon this pasteboard model he painted a face and fitted the device with rope arms and legs. The ends of the rope arms were inserted in a pair of gloves while the legs were placed in shoes, all to attract attention. At the top of the window he had the sign printed as shown in the picture. The cost price of this carburetor happened to be $25, and once the prospective customer had gone into the store to find out just what he meant by bail he could usually persuade him that $25 was a small investment that would pay large dividends.

Keep Up the Joke.

If the purchaser was humorously inclined the "jailer" was very apt to suggest that the prisoner could be bailed out for $25 and upon the payment of this fee the prisoner would become his slave for life. This same scheme might be worked out advantageously in a smaller window. A box measuring 3 feet in width, 2 feet in height and 2 feet in depth might be painted inside with gray paint and have the stone edges outlined in black. The door and windows might be cut out and black wooden bars put in place. The prisoner could be placed on the side as shown, while around the box at the sides and on the top might be grouped carburetors which the merchant was advertising.

Joining and Adjusting Repair Shop and Garage Machinery Belting

Carelessly Placed Pulleys, Shafting Poorly Lined Up, or Poor Belt Joints Cause the Waste of Power and Money in the Garage.

BY J. F. SPRINGER

A GOOD machinist knows that where there is friction there is destruction; he also knows that friction causes loss of power, and tries to eliminate it as much as possible. In a garage or machine shop the power machinery must be kept to efficiency but unless the shafting is lined up correctly, and the belts properly joined at the ends, the friction, in the power transmission alone, amounts to considerable. A solid and heavy belt joint in passing over a pulley often shakes the whole line of shafting and the good machinist does not permit a poor belt joint in his shop. There are two types of belt joints, cemented and laced, and both require considerable care in their preparation.

The Butt Joint.

When uniting leather belting by means of lacing, a butt joint should be used; the ends of the belt are cut square so that they fit together without being beveled. Two rows of holes should be punched in each end of the belt. These holes may be round but preferably are oval. If the belt is three inches wide, each row should contain two holes as shown in Fig. 1. A wider belt may be given three holes in the row next to the end and two holes in the rear row. If the belt is quite wide; five or six inches, four holes should be used in the front row and three in the row at the rear.

In every case where there are a different number of holes in the two rows the holes should be "staggered." Thus, with three front holes and two rear ones, each rear hole should be placed half way between consecutive front holes.

If, on the other hand, the belt is very narrow, a single row of holes may be used in each end. In this case the holes should be punched exactly opposite each other and an extra hole should be placed back of the rear hole about half way between the sides of the belt. In lacing, the strip of rawhide or other lacing material should be so managed that on the side of the belt next the pulley all of the "stitches" will be parallel with the length of the belt. There are no oblique "stitches" on this side. On the outside face of the belt, however, there will be such "stitches."

Laying Off the Belt.

I will now explain how to lay off the belt ends preparatory to punching the holes where there are to be three holes in the front row and two in the rear row, as shown in Fig. 2. Suppose the belt is 4½ inches wide. Two

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lines should be drawn parallel to the end edge of the belt, the first line 7/8 inch back from the edge and the second line another 7/8 inch back. Then lay off parallel

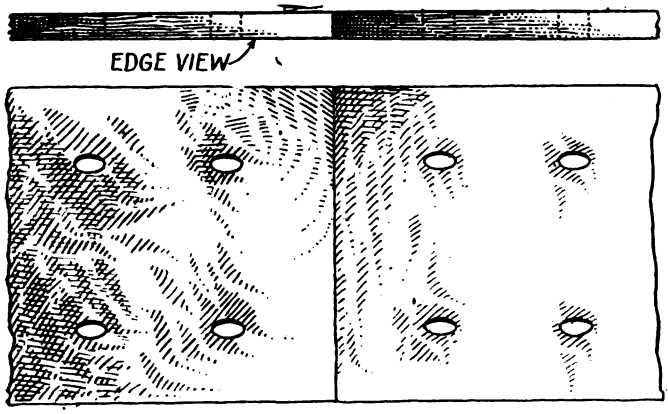


Fig. 1.—How Holes Are Placed in a Narrow Belt.

lines lengthwise of the belt and dividing its width into six equal intervals.

Three points should be made where the lines cross, next to the end, beginning with the crossing nearest a side edge and leaving two spaces between one hole and the next in the same row. There will be then three holes in the front row, 1½ inches between centers with ¾ inch distance from the center of one side hole to the outside edge of the belt. The two holes in the rear row are also put two spaces apart, and there are also two spaces between a hole and one side edge of the belt. The illustration makes all this clear.

The sizes of the holes will vary with the belt. For a three-inch width a 3/16-inch hole is suitable, and for a wider belt, up to six inches, a 7/32-inch hole is the proper size. The width of the lace may be 1/16 inch greater than the diameter of the holes.

Glued Joints.

When the joint is to be made by gluing, six or eight inches should be added to the length of the belt. The extra length is necessary because a lap joint is to be made. Under no conditions, however, should the thickness be increased where one end is lapped over the other. Consequently provision is made for this, by thinning the ends evenly, from a distance back of the end down to no thickness at all at the very end; see Fig. 3. The distance back of the end is exactly the amount of the extra allowance in the length of the belt.

The two ends should be glued together under heavy pressure. This is a good way, and is perhaps the most practicable.

A great advantage is that the belt is now an endless loop with no inequality in thickness or extra weight at the joint. The disadvantage is that a good deal of time is required. This would not be important if it were not for the fact that belts stretch as they are used and require taking up at the joint from time to time. With the lacing system and with the metal fastener system, the belt is readily and quickly shortened. When gluing the joint, we may add to the strength by using a number of smooth metal rivets.

Metal Fasteners.

Belt ends may be joined by metal fasteners. One such fastener consists of a single piece of metal provided with two rows of points. But putting these points through the belt ends, one row through each end, and then clinching the points on the other side, a joint may be made very quickly. Other metal fastenings consist of staple-like pieces. A number of these are used to effect the union of the ends. Then there are still other forms. One of these is a kind of stud similar to one of the usual varieties of cuff buttons. That is there is a little bent bar with a head on each end. Slot-like holes are prepared in the belt ends and the studs put in place.

To summarize the various methods: The spliced and glued joint is the best, but it takes time; the laced joint is perhaps the next best and it may be quickly made; the joint made by metal fasteners is perhaps not quite so good as a laced joint properly made, but it can be made in very quick order.

Arranging Shaft Lines.

In arranging line shaft, counter shaft and machine, it is well to bear in mind that belts should be arranged so as to press by gravitation on both pulleys and not simply on one of the two. This rule is effective in preventing the use of one pulley directly beneath another. In such a case, the upper pulley alone carries the weight of the belt, which is against the rule. One pulley must be separated horizontally from the other. Do not be afraid of having a long belt. A considerable horizontal distance between pulleys is better than a short one. The belt should sag. Naturally, it will often or perhaps usually happen that one pulley is higher than the other. This is

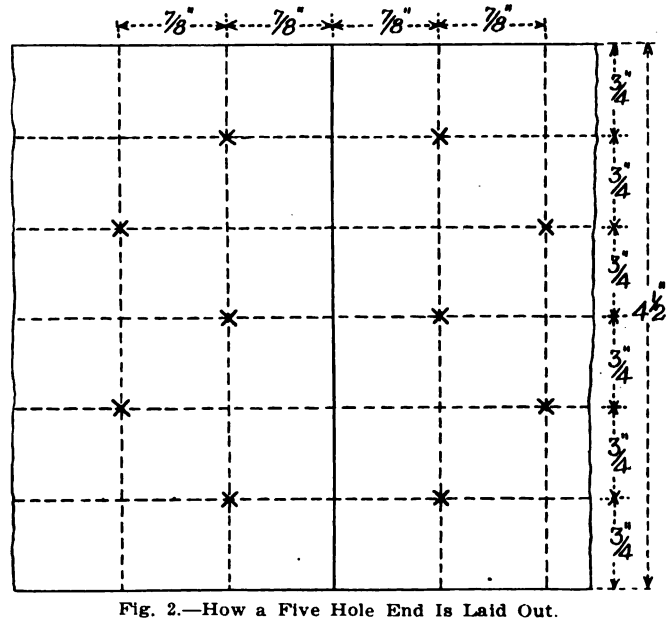


Fig. 2.—How a Five Hole End Is Laid Out.

all right, but the line drawn from hub to hub should not make with the floor an angle greater than 45 degrees.

In order to determine the length of belt to order for a given case, one may proceed in several ways. The easiest

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thing to do in many cases is undoubtedly to run a tape line around both pulleys and draw it up properly with as little sag as possible. This will give the length for a loose belt. To get the proper length to produce a

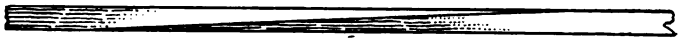


Fig. 3.—Side View of a Glued Joint.

suitable degree of tension, subtract two per cent of the total length. This is for single-thickness belts. If the belt has a double thickness subtract somewhat less, or from one to one and one-half per cent.

The counter shaft will often rotate faster than the line shaft. That is, the pulley on the counter shaft will be smaller than its line-shaft companion.

Twisting Belt Lines.

Sometimes it is desirable to rotate one shaft in one direction and the companion shaft in the other. This may be done simply by crossing the belt between the two pulleys. At other times, one may desire to set on shaft at right angles to the other. If the shafts are not too close together, the belt may be twisted sufficiently to accommodate the rim faces of the two pulleys, provided the setting is correct.

Some explanation is needed here to make clear the meaning. When two pulleys are belt-connected, one is the driver and the other is the driven. The driver pulls on one-half the belt and "lets go" on the other half. The driver exerts its pull from the point where the belt comes onto the rim and for a distance around the wheel. It is important that, from the point where the belt arrives on the driver, to the point where the belt leaves the other pulley it shall lie squarely in the plane of the driver. That is, all the belt actually on the driver and all of the tight side of the belt from driver to the driven pulley must lie in one and the same plane. When this arrangement is carrid out, then the tight part of the belt is not being pulled out of the plane of the driver, but only suffers a quarter-twist in that plane.

Keeping Ahead of the Scrap-Pile in a Small Repair Shop

Iron and Brass Scrap Should Be Sorted Carefully and Only Those Articles That Can Be Restored To Good Condition

BY W. A. MANN

FOR the really heavy stuff it will be better to have a series of substantial bins on the floor, and they can hold big springs, castings, heavy shafts, axles and parts, rims, etc. It is not very likely that there will be, and there should not be, much accumulation of this heavy material in a small shop. Cylinders that are so badly smashed that they are not worth repairing are not likely to be of any use and the same may be said of crankcases and transmission housings and, in fact, most of the heavy stuff.

Unless the boss can see some profitable use for such things they are better allowed to accumulate only until there is enough to bring a worth-while figure from the junk dealer. Care should be taken, however, to keep the different kinds of metal separated—cast iron, wrought iron, ordinary mild steel, alloy steel, aluminum. There is a wide difference in the prices of different kinds of scrap, and well the metal dealer knows it.

Some of the scrap affords opportunity for more or less work on the side, allowing the boss to keep himself and his men occupied when they might otherwise be idle, and turning an honest penny at the same time. For example, a spring with one or two leaves broken can have new leaves put in and be put in shape to be sold to someone who wants a spring replaced and will be glad to get a used spring at a reduced price. Once in a while an opportunity occurs for making quite a neat little sum, and one of these opportunities came under observation during the past winter.

A repairman who has a shop that does quite a large variety of work, including autogenous welding, was called upon to put a new cylinder block into a four-cylinder car. The water had been allowed to freeze in the cooling system and the result was a burst water jacket that looked rather bad, and the owner simply ordered a new block rather than have the old one repaired.

He Made a Job of It.

The old block, left in the repairman's hands, was entirely overhauled. The jacketing was welded up; the cylinder walls were intact. The cylinders were reamed true, having been slightly worn. Finally, the boss invested in a set of new pistons, oversize, and fitted them in. Then the whole thing was set aside to await its chance. It was an investment, and though the boss was reasonably sure he would cash in on it sooner or later, he could not of course tell how long he might have to wait.

As a matter of fact he waited about eight months. Luck was with him, for a car of the right make and model came in, on the end of a tow-rope, with one of its cylinders badly smashed by a broken connecting rod, though the crankcase was but slightly damaged. Speed was asked for in getting the machine in running order, and the boss figuratively patted himself on the back as he

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hauled out his repaired cylinder block and got the car running at least three days earlier than would have been possible had it been necessary to order a new block and wait for it to arrive.

Though it is not to be expected that such things will happen every day, the shop proprietor can readily take advantage of the principle involved in this transaction. Parts can be kept carefully until, perhaps, there are enough to be assembled into a fairly good whole. Or maybe the parts themselves can be put into such condition as to be used again, as has been suggested. These all are things that have been done, time after time; yet it is not common practice among garage operators to do them.

The High Cost of Steel.

Scrap tool steel should be handled with much care, for the present price of tool steel makes its purchase burdensome. When it is required that some new tool shall be made there is no use buying the steel if it is already on hand in some form. Broken drills, taps, old files, all can be turned to account. Of course the drills and taps will be used until nothing is left but the shank. The idea of throwing away a drill because it is broken short, or a tap for the same reason, is not countenanced even in a big shop. Short drills and taps cut as well as long ones and they have a positive advantage for some kinds of work, for the shorter they are the harder they are to break.

When a tool actually gets beyond its original usefulness, however, it becomes stock steel. It can be softened by heating it to a cherry red and burying it in lime overnight—or even burying it in the ashes of the forge, if a coal fire is used. A second annealing will make it still softer, but care should be taken not to make the steel too hot or it will be spoiled for tool-making purposes.

Occasionally the necessity arises for making a new part for some place where the original part showed abnormal wear or weakness. If the original was of ordinary soft steel the repairman has a chance to make an improvement by putting in a piece of tool steel, and the raw material may be conveniently taken from some of his scrap stock, using the piece that comes nearest to the requirements of the moment.

Old files are particularly valuable. Softened as described, they can be used for many purposes. Even without softening they have their uses, or at least some types of them do. A half-round, a fish-back or a flat file can be made into a very fine scraper by grinding off the teeth and grinding the end perfectly square across. Carefully made, such a scraper will hold its edge and do good work for a very long time. A piece cut from a small square file can be converted into a very fine center-punch, the grip being left square and with the teeth on but just touched up on the emery wheel or grindstone to take off the harshness, and the head and point ground round. A round file can be used in the same way.

In a shop where there is a small lathe all the tools can be made from old file-steel, and the many odd-shaped little chisels, that so often are handy, can be formed up from the same stock. File steel is good for making permanent magnets, such as often are used for fishing purposes, recovering small iron or steel parts accidentally dropped into places where the hand cannot reach. Once started along this line of work the ingenious garage man will soon discover that there are many other ways of using scrap steel and thus economizing, which means adding to the ultimate profits of the shop.

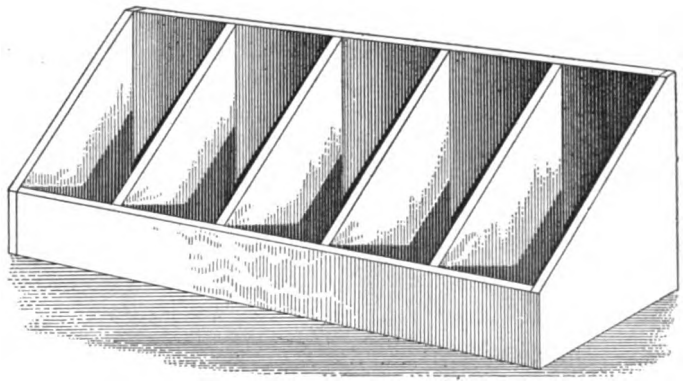
Many Uses for Tubing.

Steel tubing of all sorts should be kept most carefully, for there are many uses for it, and, like tool steel, it is expensive just now. In fact it often is difficult to get it at all, especially in certain sizes. Many a badly worn shaft has been saved, by shrinking a sleeve of steel tubing over the worn part and turning the new part down to the proper size and accuracy of surface.

Often a piece of tubing will come in handy for a job where the repairman would otherwise have to drill through a piece of solid stock, and this is no joke in some cases. Tubing is good for making sleeves, spacers, for splicing and repairing. Steel tubing cannot be hardened like tool steel, but it can be case-hardened if necessary, and it usually takes a very good "case."

There's Much In It.

It is earnestly suggested that the reader, especially if he is considering the establishment of a repair shop, give genuine thought and attention to this matter of saving space and making the most of scrap, rejected parts and odds and ends. The writer knows by experience that there is actually a great deal more in it than appears on the surface. The most efficient use of such material comes with practice and experience. The more ingenious and quick-witted the repairman is the more he will get out of his junk. And be it said that, further, the more of this sort of material he saves and the better he classifies it, the more uses he will be enabled to make of it.



Suggested Design for Large Scrap Bins.

Many a clever bit of special shop apparatus has been put together with a piece of shaft from one box, a

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couple of old bushings from another and various odds and ends, the whole outfit costing perhaps almost nothing except the time put on it. The handling of this material in the proper way gradually becomes a fixed habit.

When putting a scrap of tubing into its proper box the mechanic thinks to himself "There's a bit of stuff that'll make a sleeve for a brake cross-shaft for a Blank car" or "Those bushings can be turned down to fit the camshaft of the Dash 1917 machine," and when various repair jobs turn up he has in his mind a pretty good idea as to where he is going to get his stock, or at least where he is going to look for it.

Don't Junk Valves.

Old engine valves are good to keep for two reasons. One is that the stems are good for use where small pieces of round steel are wanted, and in many cases the steel is of very good quality. Another is that it often is possible to take an old valve and make from it a brand new one of smaller dimensions, this being a simple piece of lathe work. Making valves would usually come under the head of off-time work or else emergency work.

It would hardly pay to make valves in this way if new ones were easily obtained. In making over valves it is necessary to look out for those which have cast iron heads and steel stems and make sure that the junction of the two metals is not weakened in the remaking process.

Old valve springs are not worthy of much attention. A valve spring that has been in service for a long time loses much of its good qualities. Some of the better preserved ones may be useful, however, for emergency replacements or for some odd job where a spring is needed that does not have to stand the tremendous duty that is imposed upon the valve springs.

There was a repairman in the Middle West who carried the principle of using up scrap about as far as it could be carried. He had a fairly large shop, did a good business, and he had his material sorted according to the plan we have described. In truth, he is responsible for most of these ideas, and it is his example that has shown what real economy can come from such work.

This man took it into his head that he could build a complete engine from scrap parts, and for two years he saved sets of parts of three different makes, to try to get enough for his purpose. He was like a boy "saving up" for a bicycle, and he took a great deal of fun out of his hobby. Finally he saved everything he needed for an engine—it was a Ford, as might have been expected—except the camshaft. He could not get hold of a camshaft that was fit to use, so he bought one; but it actually was the only part of the engine that was not repaired scrap. The engine ran apparently as well as a new one. It may be added that the flywheel magneto was not included; an ordinary flywheel was used, and battery ignition. Whatever became of the motor the writer does not know; but it was the ingenious repairman's idea to get together scrap enough to build the balance of a chassis and so have a complete "junk car."

WOMEN IN BUSINESS.

Women Are Becoming a Big Factor in the Industrial World and Do the Work of Men Satisfactorily When Properly Trained.

"WOMEN engaged in industrial work, in the shop and factory, are adapting themselves to conditions, and grasping the fundamental principles of their work, with a readiness and efficiency that is truly surprising and gratifying."

The above statement from E. F. Primmer, manager of the employment department of The National Cash Register Company, Dayton, Ohio, is based upon close study and information obtained at first hand in one of the best known industrial concerns in this country. Mr. Primmer further said:

"While an untold number of reports have been made, the subject of women in industry is constantly enlarging. What seems strange and startling to-day is commonplace to-morrow. Government reports, magazines and newspapers daily are filled with statements about the ever-widening horizon of women's work. Women are eligible for employment in so many unusual occupations that it would be difficult to briefly enumerate them. There seems to be, however, only one boundary to the field of women's activities, and that is imposed by physical limitations. No one will argue woman's physical equality.

"In England, where there was a national desire to help meet the terrible emergencies of the war, women unwisely overrated their strength and set themselves at tasks which later proved detrimental to their health. American industry, profiting by the experience of England, wants continued output, rather than sporadic bursts of effort. Every man and woman in industry to-day, or in the future, must realize that it is the steady pull that will count at this crucial period in the world's history.

"While the great influx of women into industry was hastened by war conditions, yet it has not been wholly due to that cause. Armies of women are earning their own living because of the stress incident to the increased cost of all things. Hundreds of women have gone into the industries because they desire to be independent, and they do not regard their jobs or positions merely as bridges over the gap until marriage.

"Their induction into industry will have a beneficent, permanent result. It will mean the introduction in many factories of systems that are important to the health, safety and welfare of all employees. Improper surroundings will be eliminated and labor in general will be better off and better satisfied because of more desirable working conditions.

"There are, however, some things the women must be taught besides being given specific training for specific work. They must learn to be regular in attendance, because they cannot expect to earn good wages unless they work steadily. They must adopt a business-like attitude toward their work, and regard their tasks as an opportunity for personal training, whether they expect

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to use their experience in the field of industry or elsewhere. They must regard health and hygiene as a business asset. Women are notably careless in matters pertaining to health, and frequently are unaware of the part poor health plays in reduced earnings or future happiness. They must be frank, straightforward and forego the privilege of having 'feelings.' If they remove the handicap of claiming privileges because of sex, they will find greater opportunities for advancement and sooner realize their ambition of equal work for equal pay.

"This company has always employed a large number of women for clerical and other work, and with very satisfactory results. However, it was only when the war came, completely changing industrial conditions throughout the United States, steadily decreasing the number of men available for both skilled and unskilled work, as the demands for war materials increased, that it was found necessary to employ more women in this factory. They have made good in a manner so satisfactory that the opportunity for women to engage in industrial work here will be greater each day, as the men are called for military service. Our company has positions open for many women."

It is interesting to note in this connection that it was the women who saved the labor situation in England. By the energy and ability displayed, they awakened the people and were given the right to vote, as a small measure of thanks for the tremendous work they are doing. In England women are doing nearly everything that men have done, and doing it well.

GLOWING TRIBUTE TO THE AUTOMOBILE.

THE following essay on the automobile, contributed by Dr. Frank Crane to the New York Globe, will no doubt be read with interest by a great many of our subscribers.—Editor.

Civilization is a matter of Transportation.

The true symbol of the Twentieth Century, the sign of its soul, the indicator of its spirit, is the Wheel.

The Wheel breaks down national barriers and unifies humanity, it removes prejudices, race hate, group egoism. All narrowness, superstition and ignorance give way before it. It liberates the soul of man from the grip of the past.

There was the horse-drawn vehicle with wheels, the steamboat, with its submerged wheel, the bicycle, the automobile, and the airplane. All are adaptations of the Wheel.

And the greatest of these today is the Automobile.

"There are," says John N. Willys, "some 4,000,000 of these passenger cars in this country. They are travelling 40,000,000 miles every day, the equivalent of 1,600 times around the earth. Their estimated annual passenger mile service is 60,000,000,000, against 35,000,000,000 for our railroads."

The automobile is not a competitor of the railroads; it feeds them. Transportation is a thing that grows upon its increase. It is not true that there is just so much travel, and if the motor gets part of it the train gets that much less. On the contrary, travel is elastic. The more you have the more you need. When they built the elevated and subway roads in New York it did not empty the surface street cars; it filled them fuller than ever.

The automobile truck is especially useful for the short haul. Already there are a number of established truck routes for freighting. A vast deal of the suburban delivery business in the cities is done by motor, yet the railways are as busy as ever.

Last winter's transportation congestion gave us an idea of the danger from clogging the arteries of communication. As the motor truck comes more into general use such crises will be obviated.

As the typewriter increased the size of one's correspondence many-fold, and as the telegraph swelled the volume of communication without lessening the volume of mail, as the telephone multiplied messages without detriment to the telegraph, so the automobile has not been to the prejudice of the street car, steam train, or other means of carrying and going, but has simply added to the fluidity of commerce and traffic.

It has increased national efficiency. The farmer can get more work done with less effort. The doctor can see more patients. The jobber can serve more customers. The travelling salesman can cover more territory. The police can secure prompter action. The fire engine moves faster. The business man keeps more appointments. His wife attends to her social duties with less effort. Recreation is simplified. The great Outdoors is brought nearer the city. All forms of activity are lubricated, expanded, made easier and pleasanter. And the general health of the people is decidedly advantaged by luring them more and more into the fresh air.

The automobile, the ultimate wheel, has made life richer, freer and happier.

Real Speed.

There are still some parts of the country where an automobile is an unfamiliar sight. A touring car passed through a small town in northern Kentucky at top speed. As it disappeared from sight in a cloud of dust one old settler, rubbing his bulging eyes, remarked: "Gosh! Them horses sure must ha' been traveling some when they got loose from that gentleman's kerridge!"—Milestones.

When There's a Will.

Country Constable—"We haven't had any motorists violating the speed limit for 'most a week."

Justice of the Peace—"We'll have to arrange to lower the speed limit."—Milestones.

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Automobile Dealer and Repairer

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ADVERTISING RATES MADE KNOWN ON APPLICATION

NEW YORK, JUNE, 1918.

Missing Numbers—Our Readers are requested to remember that it always gives us pleasure to re-send numbers which have gone astray in the mails.

The Automobile Dealer and Repairer in New Zealand.

Mr. R. Hill, Matlock House, Devonport, Auckland, New Zealand, is our accredited representative in New Zealand for obtaining new subscriptions.

We Want You to Feel That You Cannot Afford to Cancel Your Subscription

UNLESS something is done very quickly, shortly after the receipt of this magazine a new zone postal law will go into effect. This will mean that the cost of the magazine will be increased considerably and with the increase of the cost of paper and labor, our expense will be nearly double.

We trust that all of our readers are loyal to us and we hope that they appreciate our magazine. We do our utmost to keep up the standard of reading matter in its pages. We strive to print only such articles as are of value to the automobile owner and the automobile repair man. We use our utmost efforts to eliminate all unnecessary "filler stuff,"—reading matter that is put in the magazine simply to fill space. We feel that we are safe in saying that our magazine only contains reading matter which is of interest to all of our subscribers.

This is not a newspaper. It is a magazine devoted to education. For the car owner it gives practical suggestions and information, in language which he can understand, that will be of assistance to him in repairing his own car if he cannot afford to have it repaired by an experienced mechanic. For the repair man the magazine gives suggestions for increasing business and for doing efficient repair work, written by contributors who have studied the automobile situation since its beginning.

For the automobile and accessory salesman there are stories, which should be of infinite value because of their originality. Every word should be of interest to every reader because the articles are so written that they bring out new facts and speak of the progress in the automobile field.

Even the so-called filler articles are valuable because they contain much information "boiled down" to just a little space. Nothing is repeated; nothing is copied. To use the expression of one of our enthusiastic readers, "the magazine is all meat."

One Way of Showing the Boys in Uniform That You Appreciate Their Sacrifice

UNDOUBTEDLY many of our readers are above the draft age and because of good reasons are unable to join the American forces in the camps on the other side. Everyone who cannot do their part by fighting should do their part at home. They should try to show their appreciation of the work that our boys are doing and lend their support to the soldiers who are striving to make democracy possible.

There are many ways in which you can show your appreciation of a soldier's sacrifice, and least of all you can give him a lift when you see him walking if you are riding in an automobile. It is very possible that he may be on a leave of absence for but a few hours and if you carry him any distance towards his destination he will feel that you are doing your part.

Not long ago the writer was at one of the training camps in the Eastern part of the country and every soldier with whom he talked, sooner or later, spoke of the kindness of a certain man who resided near the camp. This man owned a seven passenger car and he divided every Sunday into three periods of three hours each. This time he devoted to pleasure trips around the country. Invariably he invited a number of the soldiers to go with him, being careful to take those boys who lived far away from home and were most apt to be homesick. He said that he was more than repaid by the thanks of the boys and the pleasure that he derived from their society. Under any condition he would have used the car all day for recreation and he felt that it cost him but little more to share his machine with the boys who were giving their lives that he might prosper.

A Bill Which Should Be Considered Very Carefully Before It is Finally Adopted

THERE has been considerable agitation in certain foreign countries about a bill introduced into the House of Representatives providing for a distinctive national trade-mark under government license, to be attached to things of American origin. This bill to a casual reader might seem to be just what is needed at the present time. Undoubtedly many of the foreign countries will

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show preference for American made articles and such articles should be identified by some means or other.

There is one big fear, however, of such a procedure as is recommended in the bill before the house and that is, that the trade-mark carries the impression that the goods upon which it is placed are sanctioned by the government. In other words, the bill is too broad and may cover "a multitude of sins." If the bill passes it will mean that all American products may be marked with this national trade-mark and we feel that it will operate to the detriment of efficiently produced, standardized American goods of quality.

A dishonest manufacturer would be especially eager to avail himself of the opportunity thus presented. His produce might be of an inferior grade and since it would bear this national trade-mark, it would inevitably result in the undermining of American trade prestige abroad. Foreign business houses or individuals who purchased goods of this kind would be prejudiced against American products. A manufacturer of high-class goods would be placed in the class of the manufacturer of inferior goods, and unless considerable care were exercised, goods bearing this national trade-mark might be shunned by foreign importers. We feel that responsible American producers are able to establish the preeminence of their products under their own marks of identification, and would not be interested in an "omnibus" trade-mark maintained by the government under which may be carried both reputable and disreputable goods. We feel that such being the condition goods need only bear the words "made in America."

If You Are a Loyal American You Will Not Permit the Waste of Gasoline

CONSERVATION is the word most used today throughout this country. It is only by making the most of our natural resources that we can hope to win the war easily. Undoubtedly we will win the war because every loyal American is doing his best to aid the cause. But there are two ways of winning it. We can be "bled white" if we are not careful, or we can "come out even"; it all depends on the way in which we "carry on."

We have fuel administrators and food administrators who are doing their best to make the American public see the necessity of preventing waste. Every time the automobilist uses his car unnecessarily, he wastes gasoline which might be used upon the other side. Permitting an engine to run for many minutes at the curb is a disloyal act. It is just as thoughtless as eating meat upon a meatless day.

It is true that the motorist may be able to pay for the gasoline which he wastes: that is not the question. Every gallon of waste gasoline means an additional cost later on and every loyal American will do his best to prevent such waste. Next time you see an automobile stopped at the curb with the engine running, make a point of speaking to the driver just as much as you would make a point of speaking to a pro-german were he to utter disloyal words.

There have been rumors that we would soon face a situation such as England is now facing, and the use of gasoline for passenger cars would be limited. Unless you want this situation to arise, do your part in preventing gasoline waste. Do your best to keep your car in the best of condition. Keep the carburetor adjusted and don't spend half an hour warming up the engine. Estimates indicate that during the past year enough gasoline has been wasted in various ways to supply our Allies in the war zone. A gallon which you may waste is not much perhaps, but taken together with the gallon which the other million car owners waste, the amount is considerable. In a certain sense the burning of gasoline needlessly may be compared with the burning of a house. It is property destruction and the persons responsible should be punished.

If You Drop Your Subscription Because You Have Enlisted, Let Us Know It

WE are proud that so many of our subscribers have joined the colors and intend to fight for our country, yet, on the other hand, we feel sorry to lose them. We trust that every one of our subscribers who cancels his subscription, because he has been drafted or has enlisted, will give us his reason for the cancellation. In this way we may be able to arrange for him to receive numbers of the magazine without cost.

We are always glad to furnish sample copies and we will be more than pleased to forward the Automobile Dealer and Repairer free of charge for the duration of the war to our boys who have enlisted. We are sorry that arrangements cannot be made to send these magazines to the American troops abroad but to do so would be an unpatriotic act, because of the congestion of mails at the present time. Should arrangements be made whereby soldiers can receive magazines, our subscribers who are in the service will be furnished with copies of our publication gratis.

An Interesting Complaint From One of Our Subscribers Who Gives No Address

ONE of our subscribers, who does not give us his address, complains that we do not always answer in the Trouble Department every question that is sent to us.

That is true. We would have to publish, some months, a magazine twice the size of this one if we attempted to answer every question through our publication. We do, however, intend to answer by mail every question that is asked us, and sometimes to do this requires an expenditure of time on the part of the editor in making investigations which amounts to several hours, and occasionally a whole day, just to answer one question.

The subscriber referred to says he has asked two ques-

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tions, neither of which has been answered in our columns, but he admits that he did not sign his name, for some reason or other. As a general rule no newspapers or magazines pay any attention to questions or letters that are not signed by the writers. We do not publish the names of those asking questions, if they object, and never give their addresses, but we do insist upon knowing who is writing to us.

We would say now, for the benefit of Mr. A. L. Wade, who made the complaint referred to, and signs himself as "near Sacramento, California," that if he will write to us and repeat the questions he asked, and give us his full address, those questions will be answered promptly by mail.

Mr. Wade says, and perhaps he is correct, that 75 per cent of the help subscribers obtain from the Automobile Dealer and Repairer comes through the Trouble Department. What do our other readers think about this?

Mr. Wade also says that he is in favor of making the "ads." stand the increase in the cost of postage. It is quite apparent that our correspondent never had any experience in coercing advertisers. Advertising space is very much like any other commodity. People will pay for it what it is worth to them, and no more. It would of course be impossible to force advertisers to stand the increase in postage.

This brings up the question as to why postage needs to be increased. We have talked a good deal on this postage question, and most of our readers know that the new rate is outrageously excessive, and is bound to add largely to the cost of periodical reading matter throughout the country. The increase in subscription rates will compel a great many people to do without publications that they have become accustomed to, and would like to read regularly. If any reader has yet failed to write to his Representative in Congress, insisting upon a repeal of the new second-class postage law, he ought to do so at once, and also write to the two Senators from his State.

An Article You Should Read if You Intend to Purchase a Second-Hand Automobile

NOW that the output of new automobiles has been cut so greatly many people will find that they are unable to obtain new machines and are forced to purchase used cars. As a matter of fact, recently we received many requests from our readers for a story telling how to pick out a used car. We want to call the attention of our readers to the first story of our magazine dealing with this subject. We have tried to make the matter clear in every way so that an inexperienced buyer might purchase a car and be sure that if there were any glaring faults he would be able to discover them.

An automobile is an intricate piece of machinery and there are so many things that may go wrong without giving outward evidences of trouble. Even the most experienced mechanic may be deceived in a car. Sometimes new cars develop certain eccentricities which are puzzling so that the amateur buyer may not hope to discover every fault of the machine which he intends to purchase. However, he should be able to notice any apparent defect and make an estimate of the cost required for correcting smaller troubles.

If We Buy Only Bare Necessities Will Undoubtedly Strangle the Industries

PRESIDENT WILSON and Secretary McAdoo have both called upon the people of the United States to buy only those things which are essential to the health and efficiency of each person, in order to save materials and labor for necessary war purposes.

This advice may be good or bad, as the people try to conform to it. The logical result of saving in this comprehensive way would be to cripple the business of the entire country. If necessary for a time, of course everybody could get along with just enough to eat and drink, and a place to sleep. They could patch their old clothes, and buy no new ones, or anything else to speak of. But if this were done, thousands of businesses all over the country would be ruined absolutely.

Factories would shut down, because nobody would buy their output. Dry-goods stores, and similar places, would have to close up because they would be unable to sell anything.

If the people are making no money from manufacturing and selling goods, then how are they going to pay the enormous taxes the Government is demanding to carry the war to a successful conclusion?

The writer recalls that during the Civil War, business was even better than he had ever seen it before that war. Everybody was busy. People had plenty of money, and they spent it for what they wanted.

There is such a thing as carrying economy to a point where all business would stop, excepting war work. The men of the country, beyond war age, must have work in order to live. The women of the country must be taken care of; the children cannot be allowed to starve. To stop practically all industry, as has been recommended by the President and Mr. McAdoo, brings up the question, "How are the people to get a living?"

The benefactor of the race is the man or woman who spends money—not for bare necessities, but also for luxuries. It requires the employment of labor, and a lot of it, to produce luxuries as well as necessities. The individual suffers sometimes through spendthrift habits, but never the community. The miser may gain by thrift, and does; but the community loses by miserly habits, if they are practiced extensively.

There are many ways in which people can save money, and use it in helping the Government, without getting right down to the bare necessities of life.

Buy all the Liberty Bonds you can, and all the Thrift Stamps you can, and buy as much else as you can, so as to keep all the industries of the country moving.

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This department is maintained for the protection of our readers—especially our reckless readers, if we have any.

The object is to encourage every operator of a motor vehicle to be careful and avoid accidents, especially the inexcusabe accident of a collision at a railway crossing.

OUR COURTS have been lenient heretofore with those automobilists who ignored the laws and those motorists who were willing to pay fines when they were caught speeding. Justice has not been stern—it has covered the iron hand with velvet. Yet—motorists take advantage of our laws, as the increased number of accidents prove.

Fortunately for New York City, our Judges have at last decided that the time has come when the laws must be enforced to their utmost and not tempered with mercy. Magistrate House has decided that the reckless motorist should pay for his speed and has established a scale of fines in keeping with the present high cost of living, from 30 to 100 dollars, together with jail sentences in some cases.

When the speeding motorist realizes that time is money—that he must pay for his miles per hour in proportion as he exceeds the speed limit—then he will begin to be more careful.

Reckless driving must be suppressed, and we feel that Magistrate House is to be commended for his judgment upon offenders. Other Judges may take their lessons from him.

In the month of March, according to the report of the Traffic Court, made public last week, there were 1,152 arrests for traffic violations as compared with 566 cases in March of last year. The total fines collected amounted to $11,700, and 183 persons were sent to jail.

The automobilists of New York may well be ashamed of these figures, and the money does not mitigate the crimes. Defiance of the law should be discouraged; a criminal who breaks speed limits, or drives carelessly, is a public menace and should be forced to pay the penalty. As long as the "speed maniac" is allowed to drive an automobile, the "safe and sane" drivers are in danger.

No matter how carefully you may drive your own car, you are not safe if such law breakers are allowed their liberty; they speed across intersecting roads; they "cut the corners"; they use either side of the street; and they force you to the ditch. Like the Kaiser, they want to "own the earth."

As you value your life, the lives of your family, and your own automobile, do not tolerate open defiance to the automobile laws. Do your part in making our roads safe for "careful" traffic.

PASSED ON WRONG SIDE.—One of the forms of reckless driving is shown in an accident which occurred in Peoria, Illinois, a short time ago. A Ford car, driven at a high rate of speed, passed a second car, on the right side, rather than the left, and crashed into an automobile which was standing at the curb. The driver made off without giving his name. Such a flagrant breach of the law should be met with punishment if possible.

AN INTOXICATED DRIVER.—Four men and a driver, all of whom were intoxicated, were badly injured in Baltimore late last month, when they disputed the right of way with a truck which was loaded with telephone poles. The damaged car was driven directly into the rear of the truck, and the telephone poles telescoped the machine.

NEW BOOKS RECEIVED.

WE want to call the attention of our readers to the following new and interesting books which have been received in this office during the past month.

The Model T Ford Car, including the Ford farm tractor, by Victor W. Page, M. E. This book is published by the Norman N. Henley Publishing Co., W. 45th Street, New York, and is a complete practical treatise which covers the operating principle of all parts of the Ford automobile. It gives complete instructions for driving and maintenance and in addition deals with the Ford tractor as well as many of the truck and tractor conversion units now on the market.

The Automobile Repair Man's Helper, by S. T. Williams, a 415 page book published by the U. P. C. Book Co., Inc., 243-249 W. 39th Street, New York. This book has been printed especially for the mechanic, for the owner or for the chauffeur who has anything to do with repair work. It contains many useful suggestions relative to all parts of the automobile and gives suggested layouts for garages and dwells somewhat upon garage equipment. This book should prove a valuable asset to any library.

The Gas Motor, by Max Kushlan. This interesting book is published by the Branch Publishing Co., 542 So. Dearborn Street, Chicago. It gives the principles of gasoline engines and is of great interest because of the many hints and suggestions one may derive from it. It covers in addition to automobile engines, the types of motors used for aviation purposes.

McGraw-Hill Book Catalog. The McGraw-Hill Book Co., of 239 West 39th Street, New York City, recently issued a catalog of all books published by them. This catalog has 226 pages including the index and we would advise any of our readers who intend purchasing books to write for this catalog.

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TROUBLE-DEPARTMENT



This department is intended as a "trouble clearing house" for car owners, dealers and repairmen. Inquiries in relation to marine motors will likewise be answered as they are of interest to car owners and others who use the two-stroke cycle engine.

Readers are requested to make criticism and comments or to freely discuss any subject of interest to the automobile industry, and to add information of their own experience in remedying troubles.

Inquirers are asked to give the fullest information in every case so that replies may be made intelligently, and thus be of interest not only to the inquirer but to others.

Harley-Davidson Timing.

2438

From a Texas Reader.—1—Will you please explain the timing of a Harley-Davidson motorcycle? 2—What part does a breaker in a magneto play? I understand it brakes and allows the current to flow to the plugs at the proper time. But why is it that the points should go together and get ready to break for the next plug? Is it because the points in a magneto touch each other and make a complete short in order to allow the magneto to build up again or in other words, allow the coils to become full again, so as to discharge a hot spark? I would appreciate any information you can give me on this subject.

Reply.—The valves on this machine should be timed so that the exhaust begins to open ¼ of an inch before bottom center. The breaker points in the magneto should begin to separate when the piston has reached a point of 5/16 of an inch before top center of the firing stroke with spark fully advanced.

In the ordinary magneto the current passes through the primary or low tension winding on the armature in a gradually increasing amount until it reaches its maximum. At this point the breaker points separate and the current ceases. It is the law of magnetism that when lines of force are broken or cut electrical current is generated. The ceasing of the current in the primary winding breaks the lines of force and thereafter a high tension current is formed in the secondary coil and carried to the plugs.

We would advise you to obtain from the nearest library a book about magnetism or elementary electricity, for only in this way can you fully understand the theory of magnetos.

Difficulty In Starting.

2439

From J. R. Croy, Missouri.—I have been working on a 1915 model Ford touring car, which runs fine and has plenty of power, but in cold weather it will not start without hot water being poured on the carburetor. We thought that the magneto was weak and put in batteries, but without results. We cleaned the engine and the carburetor, ground the valves, choked the engine and flooded the carburetor, but without any effect. The car was hard to start when new, but after it had been used a while it ran a little easier, but now it is again very hard to start if the carburetor is not warm.

Reply.—We are very much afraid that we will be unable to help you, for this is one of the difficulties that comes with the use of heavy grade fuel, such as is being sold today, for if you will read the article in our March number, you will find the many difficulties which are encountered relative to the use of heavy fuel and in this way you will have your questions answered.

The writer has contended with a similar difficulty for nearly a year and can give you but little help. Be sure that the float level in the carburetor is just barely below the needle valve opening. Be sure that the intake manifold fits the block tightly. Difficult starting might be caused by leaks around the valve stems.

There are a number of devices on the market today for heating the carburetor or intake manifold, which you might investigate. The writer has used various devices such as hot sand bags, hot flat-iron and electrical iron units as well as hot water. This is just one of the difficulties that is bound to come up with the use of heavy fuel and we receive hundreds of letters containing the same complaint.

Ford Carbon Knock.

2440

From E. D. Smith, Missouri.—I have a Ford car, Model T, 1916, fitted with a Kingston carburetor, new timer, and new ignition wiring. It has worked very satisfactorily until of late when it has begun to knock and lose power. The compression is good, but at times the engine acts as though it was not getting sufficient gas. If I advance the spark, the engine begins to knock. It does the same thing if I open the throttle, and will not stop until I put the spark to within two or three notches of the top.

I have never ground in the valves, but I do not think the trouble is caused by carbon. Can you tell me what the matter might be?

Reply.—We think that all of your trouble is caused either by the valves or by carbon deposits in the cylinders. If the car has been running eight or ten thousand miles, undoubtedly the valves do not fit as well as they should, and they should be ground into place. When you have the engine pulled down to grind the valves, be sure to scrape out all of the carbon deposits which may have accumulated in the valve chambers, in the exhaust line, and in the cylinder heads. In reassembling the engine be sure that the intake manifold is tightly fitted to the block. We should advise you to use new gaskets and plenty of orange shellac in fitting the manifold to the engine.

Increasing Engine Stroke.

2441

From John Stoltenow, Jr., North Dakota.—I have an Overland, Model 81, and the engine has a four-inch bore with a 4½-inch stroke. How much power has it now? How much power would it have with a five-inch stroke?

Reply.—We doubt very much if you will obtain any more power from your engine by increasing the stroke one-half of an inch, for the very reason that horse power depends upon two factors, the volumet-

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ric capacity of the cylinders and the speed at which the engine can be run. When you increase the length of stroke you will necessarily cut down on the maximum engine speed and therefore the gain in the stroke will be lost in the engine revolutions, just about averaging the horse power obtainable. We would not advise the changing of the stroke because of so many mechanical difficulties that you will encounter.

You will be obliged to buy a longer throw crank shaft, a new set of connecting rods and possibly change over the crank case a great deal. It may be that with a longer throw crank shaft the connecting rods will interfere with the cam shaft, and the results could not be relied upon.

Poor Radiation.

2442

From Robt. Hanlan, Massachusetts.—I have a little six Buick car, and when ascending hills on low or first speed the water in the radiator boils terrifically. What is wrong? Some tell me the pump, others the timer. Kindly give me your opinion.

Reply.—Your trouble with your Buick car may be due to a number of things, and we would advise you first to clean the radiating system thoroughly. Drain off all of the water from the system and replace it with a solution of strong potash lye and water which has been strained through a cheese-cloth. Run the engine until this solution is heated thoroughly and circulated through all of the water passages.

Then draw it off and flush the system with clean fresh water. If the engine still heats, examine the pump and be sure that the rotating member of the pump has not been broken from the shaft. There is a possibility that you have been running the engine with a spark too far retarded. The sparks take place in the cylinders with a fully retarded control, at approximately top center and while the engine is running you should keep the spark advanced as far as possible, but not so far as to cause a knock.

Grind in Transmission.

2443

From G. G. Nolan, Texas.—I have an Overland car, Model 83, and have trouble when I try to shift the gears from high to second speed. The gears seem to grind, and at times it is almost impossible to change from high to second without stopping the car. Can you tell me the cause of the trouble?

I have a Willard battery, one cell of which has been ruined; can you tell me how to rebuild the battery? I believe it is necessary to remove the plates and put in new separators. Will you tell me how to remove the cells?

I have a Splitdorf magneto which misses a great deal. Please give me instructions for cleaning it?

Reply.—Your trouble with the transmission of your Overland car is probably due to the fact that the gears are damaged. Due to the constant wear caused by the scraping of the gear teeth past each other in trying to mesh them, you have hammered over the edges so that they fit too tightly, and the only remedy is to remove the gears and file the teeth smooth or replace the gears with new.

The damaged Willard cell can be removed from the battery by cutting the connecting post about midway between the connections. Then with a hot putty knife soften the wax composition material which is used to seal the cell in place. The cell may then be lifted from the battery. The remaining parts of the connecting posts may be drilled out, and we would suggest that you consult a Willard service station to find the size drill and method of doing this work. With the top of the battery clear you may lift the cover from the cell, exposing the elements, which may be renewed and the parts replaced as necessary. As a general rule in repairing a cell new separators are used.

In the April issue of the Automobile Dealer and Repairer we started a story dealing with the construction of the storage battery, and from the story you will get sufficient instruction to enable you to overhaul your battery.

There are such a great number of Splitdorf magnetos on the market at the present time that unless we know the type of magneto you are using we will be unable to give you detailed instructions. If you will give us the type number and all marks which appear on this magneto, also a rough sketch of the front and side, we will advise you further.

Before cleaning the magneto you had better see that the magnets are fully charged. As a general rule the magneto will last for a long time and cause no trouble as far as the internal mechanism is concerned.

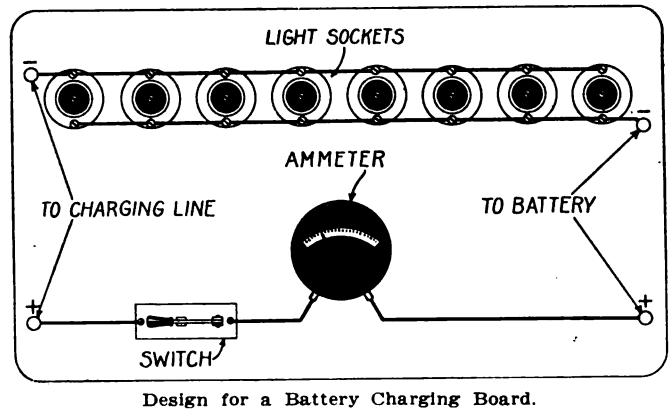
We think that your trouble is due to one of two things. Either the magnets have become demagnetized or the breaker points are not in good order and correctly adjusted. These points should be about .002 of an inch apart when the breaker arm is riding on the top of the cam. Examine them and be sure that their faces are smooth and flat. You will probably find it necessary to replace the points with new.

Electric Generator Troubles.

2444

From A. Ranken, New York.—Can you give me some advice as to where to look for troubles arising in electric generators, as well as the principal troubles generally encountered?

Will you give me a sketch of a charging board, of light resistance to be connected in circuit with lighting circuit for charging storage batteries? How



Design for a Battery Charging Board.

can one find which are the positive and negative poles of a circuit?

Reply.—The first trouble that develops in electrical generated apparatus as a rule, is in the brushes or the brush contacts. Brushes are made

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of carbon and covered sometimes with fine mesh wire. The carbon wears very fast and the brushes are quickly destroyed. When new brushes are fitted they should be made to conform with the surface of the commutator against which they rest and can be filed or sand-papered into shape. After a number of sets of brushes have been worn out, the commutator itself is very apt to become scored, and to remedy this trouble the commutator must be turned off in a lathe. If the current generation is very heavy, the copper commutator segments may be turned and cause excessive sparking. In this case the insulating material between the copper segments is higher than the segments themselves and must be cut down below the surface of the segments slightly.

These are the more common troubles to be found in generators. There are many minor troubles such as the breakage of wires, but to give you all of these would require a rather thick book.

We give herewith a sketch for a suitable charging board.

The current running into the batteries can be varied by the addition or removal of the incandescent lights. Various size batteries require different numbers of lights.

To determine positive and negative wires from outside circuits dip two wires in a strong solution of salt and water. A great number of bubbles will arise from the negative wire.

Old Maxwell Transmission.

2445

From J. H. Boudreau, Canada.—I have a 1912 Maxwell, "Model Special," in which I stripped the second speed gear. I would like to replace the gear. Can you give me directions for taking out the old one and disassembling the transmission?

Reply.—To disassemble this transmission and remove the section speed gear, disconnect the control rods and the rods leading to the transmission, then disconnect the propeller shaft at the rear universal joint just ahead of the transmission. The transmission may thus be disconnected from the rear axle and dropped downward and clear of the machine. The main shaft or sliding gear shaft can be taken out by removing the front bearing carrier which carries the driving gear. All of the sliding gears from the upper shaft may then be slipped from their places and renewed if necessary.

Maxwell Will Not Throttle.

2446

From Edw. P. Teska, Wisconsin.—Will you please give me a little information about a Maxwell car, 1916 model. When I set the carburetor on a lean mixture, I cannot throttle the engine, and when I try to speed the engine up, it spits and dies down. If I set the carburetor for a rich mixture, it will misfire and choke up; sometimes, however, it works all right.

Reply.—Your trouble with your Maxwell car may be due to a number of reasons.

In the first place, examine the valve stem guides and be sure that there is no leakage at this point. Very frequently the guides wear and allow a slight amount of air to pass them, thus diluting the fuel entering from the carburetor. The valve stems should fit the guides very closely with little or no play, but in no event should the guides be so small as to bind on the valves. If there is a leakage at this point the guides should be replaced with new.

Examine the points where the intake manifold is joined to the cylinders and be sure that the joints are all tight. Leakage at this point results in the same troubles as leakage past the valve guides. If after examining these points you still have trouble with the engine, we would advise you to install a larger hot air stove on the air intake of the carburetor and investigate some of the heating devices now on the market.

Horsepower Required for Generator.

2447

From E. H. Hall, New Jersey.—Will you please tell me how much power is taken to operate a Gray & Davis generator which furnishes six volts and ten amperes?

Reply.—The theoretical horse power required to operate a dynamo having an output of 6 volts and 10 amperes is slightly over .08. From a practical standpoint this might increase to about 1/10 of a horse power, and unless there is considerable friction this figure is large enough to cover all power required.

You can verify this figure yourself by the following electrical rule. The product of volts and ampere is equal to a watt, and there are 746 watts in one horse power. Your Gray & Davis dynamo in furnishing 6 volts and 10 amperes requires 60 watts to run it, and 60 watts is slightly over .08 horse power.

Mica and Porcelain Spark Plugs.

2448

From Fred Kegal, Ohio.—Will you kindly tell me if spark plugs with mica insulation give as satisfactory results as those with porcelain, when used in a Ford engine?

How many pounds pressure should a gauge placed in the spark plug hole show, when the engine is turned over by hand?

I have a —— ignition lock on my Ford car, and have been told that the car may be started by wiring around the lock in some way. Can you tell me how this is done, and how it may be prevented?

Reply.—There is no reason why spark plugs with mica insulation should not give just as good results as those having porcelain. It is merely a matter of preference, some drivers preferring mica to porcelain and others vice versa.

The amount of pressure in a cylinder is indicated on a pressure gauge screwed into the spark plug hole and varies with the make of an engine. The average pressure on a Ford car should be between forty and fifty pounds per square inch. At the present time a Ford car with forty pounds compression gives better results than does a Ford car with fifty pounds, because of the fact that lower compression is required for low grade fuels of the present day.

An ignition lock such as you mention when used upon the Ford coil box can be short-circuited. There are a number of ways for doing this and as far as we know there is no way to prevent this device from being "shorted" out of the circuit. To understand the method used, let us follow the path of the current from the magneto to the coil. From the magneto the current travels to the porcelain terminal

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on the dash. Through this connection to one point of the switch across the switch bar to the center, from the center to a long bar which is located at the bottom of the coil box. This long bar is fitted with flexible connections so as to make contacts with each of the coil units. In order to make the coils operate without passing the current through the switch, it is only necessary to connect the long part at the bottom of the coil box with the magneto. This can be done by removing one of the coils, dropping a wire into the box, and replacing the coil. If the wire has been scraped free of insulation and properly placed in the box, it contacts with the long bar and may be connected with the magneto and the car started.

If the lock has been attached properly, as it seldom is, the coil cannot be removed. In this case the automobile thief bores a hole through the bottom of the coil box directly beneath the copper bar and makes connection with the bar in this way. If the thief does not happen to have a drill, a hammer and a nail answers the purpose.

Chalmers Engine Backfires.

2449

From Wm. Croll, Delaware.—I wish that you would give the following information. I have a 6-40 Chalmers car, year 1916, and have had considerable trouble of late with the engine back-firing through the carburetor when I get in a heavy pull, or when the car is running at a speed of about 30 miles per hour. The repair man cannot seem to find the trouble.

Reply.—There may be any one of a number of different reasons for your trouble. In the first place, examine the valve setting. The flywheel is marked so as to indicate the opening of the various inlet valves. Turn the flywheel until the mark 1-6-In-O appears beneath the indicator at the top of its revolution. At this point the inlet valves in both No. 1 and No. 6 cylinders should start open. It may be that for some reason or other the valve timing of your engine has been altered. At any rate the valves must open as indicated by the marks.

Next examine the ignition. With the spark fully retarded, the breaker points should begin to snap apart at dead top center and should you find that this is not the case, remove the distributer brush from the distributer, unscrew the cam lock screw, loosen the cam and turn it in its direction of rotation until the points separate at the proper time.

There is a possibility that the gas mixture is too rare. See if you can prevent the back fire through the carburetor by cutting off some of the air entering through the air intake. If the engine operates with the air partially cut off, readjust the carburetor until it functions properly.

Make a comparison of the compression in the various cylinders. Turn the engine over with the handcrank and note whether the compression seems to leak past the valves. A leaking inlet valve very frequently results in backfire. Should you find this to be the case the inlet valves should be ground into place.

Your trouble may be due to the fact that the clearance between the tappets and the valve stems is insufficient. After the engine is heated, adjust this clearance so that it is not less than .002 of an inch. Examine the spark plugs, valve guides, and the connections between the intake manifold and the cylinder block and be sure that there are no leaks at any of these points.

If you still have trouble with this engine after trying the above experiments, let us hear from you again telling us just what you have done and the results, and we will advise you further.

Bosch Magneto Adjustment.

2450

From J. F. Sherman, Pennsylvania.—For some time I had some trouble with my automobile, which was fitted with a Bosch magneto. The engine operated very unevenly and I could not throttle it down without having it missfire. Having some knowledge of engines, I tried to repair it myself. I found that the spark plug gaps were set about 1/32 of an inch apart, so I adjusted them so that the distance was increased considerably. The breaker points in the magneto were set slightly closer than 1/32 of an inch, so I set them apart further, and the engine worked all right. Since making these changes, I find but one trouble—the breaker points burn away rapidly. There have been a number of repair men who have looked at the car and they all claim never to have seen a magneto with the points adjusted so far apart. They say that ordinarily the adjustment is about as close as the thickness of an ordinary piece of paper. Can you give me any explanation of this and the reason for this adjustment?

Reply.—We do not understand just what is the trouble with your Bosch magneto. As a general rule the breaker points should be set much closer than 1/32 of an inch, but we have found that different machines often require slightly different setting. One thirty-second of an inch is considerably more than we have ever seen in use and we can explain it only by saying that possibly some mistake was made in winding the machine and that it is a departure from standard design.

With this excessive spark gap, you doubtless will always have trouble because of the burning of the breaker box points. We would advise you to try to bring the spark plug gaps slightly closer together, leaving the breaker points adjusted as they are at present. This will reduce the strain on the breaker points, for as much current will not be drawn as at the present time.

There is a slight possibility that the condenser has been punctured, but if this is the case the repair can be made only at the factory.

Use of Distillate in Engine.

2451

From Walter Smith, California.—I would like to know what are the harmful results in using distillate instead of gasoline in an automobile engine. I have been told that distillate would not burn completely and that a part of it would leak past the pistons into the base, diluting the lubricant and resulting in burned out bearings. Has distillate as much power as gasoline?

Reply.—With ordinary stock equipment you should not burn distillate in the engine, for the very reason that all of it will not be consumed. A certain part of it, as you suggest, will travel past the pistons and dilute the lubricant. The only answer

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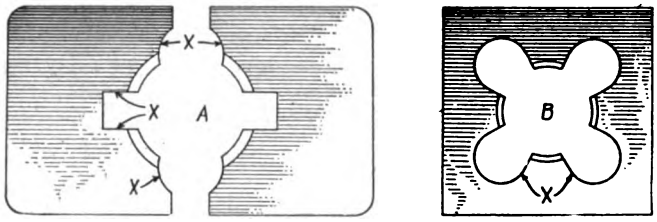
to this problem is to equip the car with some sort of a kerosene burning carburetor and specially designed manifold for heating the fuel from the exhaust. There are a few such devices on the market and we should advise you to correspond with the manufacturers. Distillate and kerosene are said to give more power, per gallon, than gasoline.

Sharpening Die Plates.

2452

From G. F. Colby, North Dakota.—Will you kindly tell me how to sharpen dies for screw plates?

Reply.—Dies are made in a number of different styles having removable cutting tools, as shown at A, or stationary pieces, as shown at B. Where the cutting members are removable, they may be sharpened by smoothing the faces at X upon an emery wheel. If the cutting members are not removable, the holes shown at X in Figure B may be reamed



Illustrating How To Sharpen Die Plates.

slightly larger. Where the whole die is case-hardened, this cannot be done unless it is softened first. As a general rule it is not practical to sharpen dies of the second type as shown in Figure B, unless the cutting members can be removed.

Transmission Trouble.

2453

From W. B. Thompson, Mississippi.—I have a 6-39 Model Linwood five passenger Paige car. The last few times I have driven the car, I have noticed a peculiar sound that seems to come from the transmission. The first time I heard this sound I was on level road, running about twenty-five miles per hour, when all at once I heard something that sounded just like gears jumping out of mesh, although the car did not jump or slow up.

I brought the car to a stop and then started up again and I did not hear anything more of this noise until I had run about three or four miles, and then the same thing happened again. I stopped and changed gears again and did not hear it any more. When I arrived in town I had the garage man drive the car for a while and he said he could not find anything wrong—the car seemed to run fine; but yesterday, when I had the car out, I heard the same thing again, and it sounded as though the whole transmission were tearing up, but after I stopped and started again I did not hear it any more, and finished my drive.

I have worked on the transmission and cleaned it all out, but could not find a thing wrong—the gears are in just as good shape as the day they were put in. I have had some people tell me that possibly this noise comes from the differential gears—I have had them tell me that if anything happens back there that it would sound as though it was in the transmission, but I don't see how it could be lack there, as the gears in the differential are all new and were put in only a month ago. The car has had no hard pulls or jerks that would cause anything to go wrong in the differential.

Reply.—From your description, we should be very inclined to believe that all of your trouble lies in the differential. From the very fact that you had it overhauled a short time ago, we are inclined to think that the work was not done correctly, or the gears were not correctly meshed. It is very possible that one of the new gears was faulty and caused all of the trouble.

We should advise you to examine this part of the car and be sure that all of the bearings are tight before having the unit disassembled. You should be able to locate this trouble by jacking up one of the rear wheels, and with the clutch thrown in and the ignition off, turn the wheel by hand. This will bring just enough strain on the gears so that if one of the teeth is broken it can be located very quickly. If you do not locate the trouble in the differential, let us hear from you again and we will advise you further.

Unsatisfactory Lighting.

2454

From John Pederson, North Dakota.—I have a Maxwell car, 1916 model, and the lights are not satisfactory. For a short time past, they have been getting dimmer and give but little light. The battery tests from 1.250 to 1.300. What is the trouble?

I have a Simms magneto and would like to know if this machine should give good results without the use of spark intensifiers.

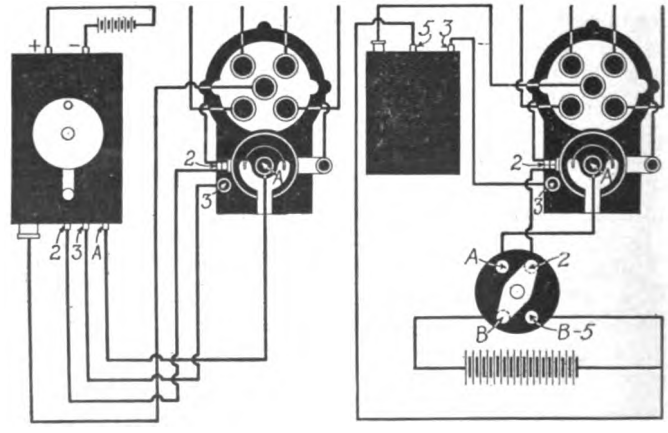
Reply.—Your trouble with the lights is probably due to the fact that the bulbs are worn out and the only remedy is to replace them with new of the same voltage and candle power. We would not advise you to install spark intensifiers on the spark plugs for the very reason that too much of a strain is put upon the magneto. Under ordinary conditions, the Simms magneto should give a good hot spark and you will be adding little or no power to the spark by the addition of the intensifiers.

On the other hand, should you install the intensifiers, you are very apt to reduce the magnetism in the field magnets.

Splitdorf Magneto Diagram.

2455

From P. E. Hedbloom, Minnesota.—Can you give



Two Wiring Diagrams of Splitdorf System.

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me a wiring diagram of a Splitdorf magneto, Model D, as used on an E. M. F. 30, 1912 car? I would like to get a diagram showing this magneto wired with the coil, together with proper battery connections.

Reply.—We give herewith two diagrams showing the Model D magneto as used in conjunction with the regular dash transformer and as used with the Splitdorf tube transformer, and trust that they will meet with your requirements.

Radiator Tube Stopped.

2456

From Wm. E. Schleiter, Connecticut.—I would like to ask your advice as to the cause of trouble with my Maxwell 1915 Model 25 car. The water in the radiator begins to flow out of the overflow pipe almost as soon as the engine is started and by the time I have driven 50 miles the water is almost to the bottom of the tank. I recently spent $5.25 to have the radiator cleaned, but the trouble still remains. The fan operates all right, and the engine seems to be in good condition.

Reply.—There is little doubt but what the radiator tubes or the pipe leading from the lower tank to the engine is stopped up. We would advise you to remove the radiator from the car, drain it, and plug the lower end with a piece of wood. Then fill the radiator with a strong solution of potash lye and water, being sure to strain the solution before placin it in the radiator. One can of potash should be sufficient. Allow the mixture to stand for at least one hour. The mixture should be mixed with hot water. Be sure to remove all rubber water connections before putting in the solution.

If this solution does not remove the obstructions or deposits in the tubes mix up a strong solution of washing soda and water and let it stand about an hour. Make a careful examination of the engine water jackets and be sure that they are clean. A long flexible copper wire may be used in the water jackets as well as the radiator for removing solid matter.

Buick Differential Trouble.

2457

From Clyde Carpenter, Vermont.—I have a Buick Model E-35 car that has been run about 800 miles. At a car speed of between 15 and 20 miles per hour on high gear, there is a grinding noise, either in the gearset or the differential, and the vibration can be felt by a person sitting in the car. The repair man here tried to remedy the trouble and claims that the reason is that the gears are not as yet worn smooth and adjusted to each other. Will you give me your opinion on this?

Reply.—We are of the opinion that this trouble is in the differential and due to the fact that the master and pinion gears do not mesh properly. You should be able to adjust these gears yourself by observing the following directions:

Jack up the two rear wheels and put the transmission gears into neutral. Remove the hand hole plate in the rear axle and feel of the backs of the gears. The edges of the teeth on the two gears should be in line at the point of their engagement. Move the adjustments until this is the case, keeping the backs of the gears in line. Adjust them so that they mesh as deeply as possible into each other. In other words, to use a mechanical expression, make them "bottom." Then back the master gear away from the pinion gear one turn of the adjustment collar, back the pinion gear away from the master gear one turn of its adjustment collar. Then have two assistants turn the two rear wheels in the same direction at a fairly rapid speed while you listen to the differential. If there is an excessive grinding it is an indication that the gears are too deeply meshed, and you will be obliged to move the master gear away from the pinion gear a very slight distance. However, be sure to move the pinion gear away from the master gear a distance equal to the distance the master gear has been moved.

While making the adjustments all parts should be held stationary. After having made the adjustments and found the place at which the gears operate with the least amount of noise, be sure to return the adjustment locks.

Rear Axle End Play.

2458

From G. A. Pansln, Illinois.—I own an Allen Model 30 Touring car and the axle gives a humming sound when the car is driven on the left hand side of a crowned road; when driven on the right hand side of the road, however, and when driving on flat pavements the noise is not so noticeable. Can you tell me how to adjust this axle?

Reply.—Your trouble with the Allen Model 30 Touring car is undoubtedly due to the fact that there is excessive end play in the rear axle and differential, permitting the master gear to mesh too tightly with the pinion gear. Sooner or later this will result in excessive wear upon the pinion gear, and we would advise you to have it remedied. To compensate for play in the rear axle, we should advise you to remove the axle from the housing and insert between the housing and the differential housing a thrust washer made either from bronze or fibre. The former is preferable, though the latter will do nicely.

You may find that a fibre thrust washer obtained at a Ford service station answers the purpose. The play between the differential housing and the axle casing should be only about 1/64 of an inch.

His Hupmobile Overheats.

2459

From S. S. Matthews, Virginia.—I have a Hupmobile 1917 car, purchased last August and have driven it about 3,500 miles. It seems to be impossible to prevent it from overheating when driving it at speeds from 50 to 60 miles per hour for three or four hours. At the end of that time the water is hot and often boiling. Though I keep plenty of oil in the reservoir the trouble is continued. Can you help me in this matter?

Reply.—Your letter is a very surprising one and we are afraid we cannot give you any cure because of the fact that the Hupmobile was not designed to be operated for three or four hours at a speed of from fifty to sixty miles per hour. We doubt very much if you will be able to prevent overheating at these speeds for the very reason that the engine is being raced continually, so to speak.

If you intend to operate this car at this speed, we should advise you to put in a special gear ratio in the rear axle. If you will stop and think for a few

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minutes, you will see that you are expecting a great deal from the car.

An automobile is subjected to many things. In the first place, the manufacturers must design the cooling system so that it will be effectual on the hottest summer day while the engine is being operated and the car stationary. Then again the water must not be cooled below a certain temperature, for if it were, during the low temperature in the winter the water would be frozen even while the engine was being operated. So you see the machine must be designed for average work. As soon as you speed it up to or above fifty miles, the radiating system is not efficient. This system cannot be made efficient for both summer and winter at both high and low speeds.

You might be able to prevent excessive heating by the installation of a larger fan—a larger radiator, or an auxiliary tank of water for the radiating system. We do not know of such a fitting on the market, but any tinsmith should be able to make an extra tank, which may be placed under the seat and connected with the radiating system.

Knock in Oakland Car.

2460

From C. H. Simpson, Iowa.—I have an Oakland Model 34 that has been run about 3,000 miles without the least bit of trouble. Lately I have noticed a knock in the engine which seems to come from the third cylinder. I have tightened up all of the connecting rods yet the knock still persists. When the engine is running slow and idling, it is sort of a rolling knock, but when the engine is pulling hard the knock is sharp. There is no carbon in the cylinders, the compression is good, and the push rods all adjusted. Will you describe the sound of different knocks in an engine and give the various causes? Would difference in compression cause a knock?

Reply.—You have asked us for an almost impossible reply, for the very reason that an engine knock is often difficult to locate even by an experienced repair man who can see the engine and examine it carefully. The best that we can do for you is to give you some advice as to how you can find such a knock.

A loose connecting rod will give a sharp knock while the engine is being forced up a hill or put to a considerable strain. Oftentimes a loose connecting rod will knock even in ordinary engine operation. That depends, of course, entirely upon how loose it is. At any rate, the knock will be more noticeable as the load is applied. A wrist pin knock is nowhere as nearly as heavy and has a more metallic sound. A carbon knock is noticeable while the engine is undergoing considerable strain and is really a dull thud which is the same as would be had by pounding two heavy books together. A knock caused by preignition or a spark advanced too far sounds about the same. A sharp knock, but considerably heavier, is had when either of the main bearings are loose. A loose flywheel gives a similar result. In both of the latter cases the knock is more evident while the engine is running idly. While the engine is under a strain the flywheel knock frequently ceases.

Very frequently a knock in the clutch or transmission seems to come from the engine itself, and about the only way to really locate a knock of this sort is by means of a special device used by repairmen.

The writer has frequently tried the following method, but it has its drawbacks if one is not particularly careful. Take a stick of wood about one-half inch in diameter and twelve inches long, and point it as you would a pencil. Place the point against the various bearings and parts of the engine and put the other end between your teeth. With a little practice you will be able to localize the vibration and the knocks.

Unless the compression in one of the cylinders varies at least two pounds or more, this will not be apt to cause a knock.

Compression Trouble.

2461

From Everett Lindsay, Colorado.—I have a 1914 Model Ford car which is equipped with an engine practically new. The engine, however, knocks when running. When the last cylinder is shorted out, the knock stops. A number of repair men have tried to find the trouble but have failed.

Reply.—As you describe your trouble, we are inclined to believe that it is due to excessive compression. Make a test of all four cylinders and compare the compression in each cylinder with that in the others. The compression the modern Ford gasoline engine should average between forty and forty-five pounds per square inch. Should it be higher than this, a knock is apt to result. The practical way of reducing this compression is to replace the present cylinder head with a new one of a later design.

Vim Truck Question.

2462

From R. L. Brumbaugh, Pennsylvania.—I have a Vim truck, 1917 Model, and the lights do not work. Please advise me if the generator is the unit in back of the fan? Does this have any connection with the magneto? Can the wiring be attached direct to the magneto, or would you advise some other lighting system? What system would you advise?

Reply.—The generator on this engine is operated by the fan shaft, and the current is generated through the coils on the holder in back of the fan. This unit has no connections with the Dixie magneto. We would not advise you to change this lighting system, and should advise you to see a service station, for the present generator should give you good results.

If you have been having trouble with the lighting system, we would advise you to go over all of the wiring, being sure that all of the connections are tight and that the insulation on the wires is unbroken.

Examine the brush contacts on the generator and be sure that they contact with the commutator. We would not advise you to make any alterations on this unit without consulting a service station.

Maxwell Compression.

2463

From W. M. Schwingel, New York.—Acting upon a suggestion found in your trouble department, I have tested my four cylinder Maxwell engine which is three years old and find that all cylinders show about 45 pounds pressure per square inch. Is this considered enough? Can I make a gauge so that I can measure the explosive pressure? I have arranged a 150-pound gauge in the shell of an old spark

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plug but it will short-circuit if I attach the ignition wire to it.

Reply.—The compression of 45 pounds is a very good average for this car and you will probably get better results with this low compression than you would if it were higher because of the fact that the average car today has much less compression than it did a few years ago.

There is no practical method of measuring the explosive pressure and if you were to find this pressure, it would indicate nothing. Your method of fastening the pressure gauge in the shell of an old spark plug is very practical for obtaining the pressure figures under ordinary conditions, but cannot be used in conjunction with the ignition system for the very reason that a wire attached to it would short-circuit through the plug to the engine. The only practical method of obtaining the compression at the time of explosive would be to attach the pressure gauge to one of the petcocks and use the spark plug in its regular place.

Flooded Magneto.

2464

From J. C. Brown, West Virginia.—I am having trouble with a Dixie magneto which has been flooded with water. The coils have been baked out and tested and seems to give current when tested with a storage battery, however it will not generate its own current. Can you tell me what the matter is?

Reply.—Either the primary coil has been short-circuited or the water corroded the connections to this coil. The only thing that we can advise you to do is to take the magneto apart and make a test of all the coils, replacing with new such as are found to be at fault. If you do not feel qualified to test the magneto yourself, we would advise you to return it to the factory. Baking the coils will probably do no good as the damage has already been done.

NEW AND INTERESTING THINGS IN MOTORDOM

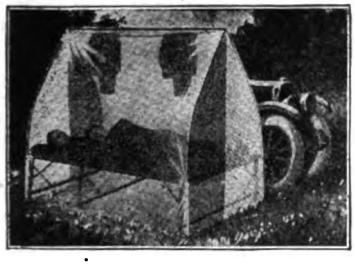
Rayfield Carburetors.

We have told our subscribers, repeatedly, to do their part in conserving fuel, and it is almost impossible to get full efficiency from an automobile fitted with an old style carburetor.

Carburetors five or six years old are seldom efficient when used with present day fuels. Many drivers are not satisfied with their present equipment and we would suggest that they investigate the line of carburetors manufactured by Findeisen & Kropf Manufacturing Co., 21st and Rockwell Streets, Chicago, Ill. These carburetors are designed by experts who are familiar with fuel requirements of today and are made according to the latest design.

The Tentobed.

The Traveling autoist who desires a camping equipment of minimum weight should investigate the Tentobed bed manufactured by the Tentobed Co., 3422-3426 West Lake Street, Chicago, Ill. The whole outfit weighs but 45 pounds and rolls into an extremely small space. The tent is made of heavy drill treated by a special process which makes it absolutely waterproof and mildewproof. The bed is large enough to accommodate two people and is strongly constructed. The complete outfit is covered by a dust and rainproof carrying case. It may be obtained in three styles and any of our subscribers intending to go upon a camping trip should investigate this product.

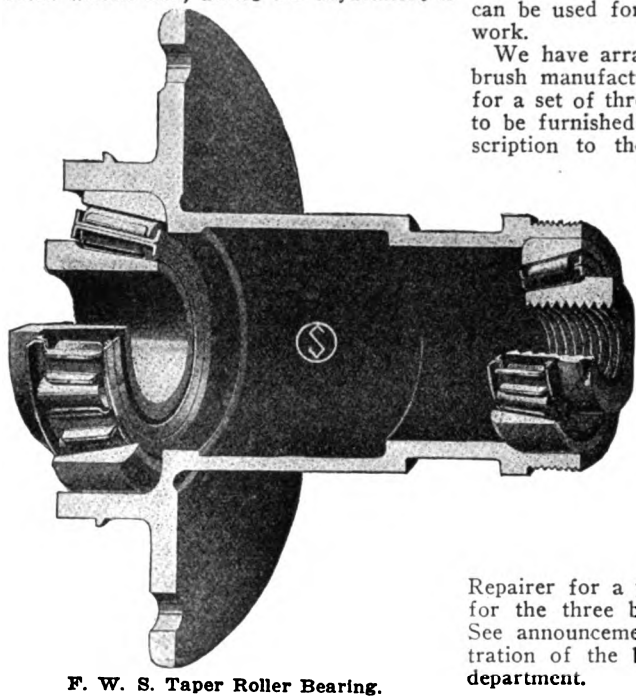


The Tentobed.

Subscribe to the "Automobile Dealer and Repairer," $1.00 Per Year.

F. W. S. Taper Roller Bearings.

Many car owners are dissatisfied with the front wheel equipment of their Ford or Chevrolet 490 cars. Both of these machines are fitted with ball-bearings in the front wheels and, unless the adjustment is very carefully made and maintained, considerable trouble results. The Bearings Shop of 1402 Michigan Avenue, Chicago, Ill., are putting out a product, termed the F. W. S. Taper Roller Bearing, a device which is interchangeable with either Ford or Chevrolet 490 front wheel bearings. As the name indicates, these bearings are of the roller type and are said to be very efficient.



F. W. S. Taper Roller Bearing.

Something About Brushes.

As many of our readers at different times have had occasion to use paint and varnish brushes in connection with their automobiles, the question of brushes becomes a rather important one. Ordinarily, of course, most people see no difference between one brush and another, but there is an amazing difference. One will shed its hair to such an extent that a good job of either painting or varnishing cannot be done with it, while another and a properly constructed brush can be used for a long time and do good work.

We have arranged with one of the best brush manufacturers in the United States for a set of three paint or varnish brushes to be furnished in connection with a subscription to the Automobile Dealer and Repairer for a year for the sum of $2.00 for the three brushes and the magazine. See announcement together with an illustration of the brushes in our advertising department.



Tire Rebuilding Stand.

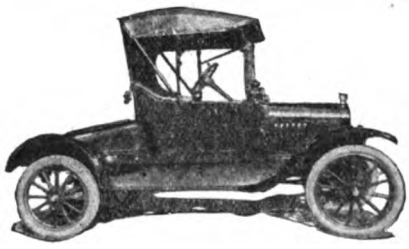
Tire Rebuilding Stand.

The Williams factory and Machine Company of Akron, Ohio, have recently designed a stand for tire repair shop use. This stand is made especially for shops which do retread work or make sectional repairs, and is built upon the same lines of the stands used for hand operations in tire factories. Unlike the latter, however, it takes up a minimum of floor space and is very light in weight without sacrificing convenience or strength. Another feature is the spring ratchet attachment which permits the turning of the tire either way at will, or locking rigidly in any desired position.

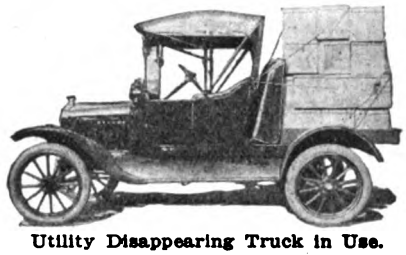
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Utility Disappearing Truck.

A device has recently been placed upon the market by the Hill Pump Valve Co., 22nd Street and Canal, Chicago, Ill., which



Utility Disappearing Truck Closed.



Utility Disappearing Truck in Use.

is known as the Utility Disappearing Truck and has been designed especially for the Ford Roadster car. It makes possible the use of this car as a half-ton truck upon which may be carried coal, groceries, milk or other commodities; or it may be used for carrying additional passengers. When not in use, the body slides beneath the front seat entirely out of sight, beneath the turtle back of the machine. To change from passenger car to truck, only two seconds are necessary. The turtle back of the Ford car is lifted and the truck body is pulled out to the desired length. The turtle back when lifted rests against the back of the front seat and prevents it from being scratched or marred. The price is extremely low and as it evidently is of such great utility we should advise all of our Ford owner readers to investigate.

An Addition to Their Plant.

To meet the constantly increasing demand for its product and particularly to care for the requirements imposed by the war, the Metal Hose & Tubing Company, Brooklyn, N. Y., makers of Triplex Gasoline Hose, have started construction on an addition to its plant. The building is of permanent construction in brick. The new space will give 5,000 square feet more for manufacturing purposes and the factory will immediately require all of it.

The Vacuum Muffler.

A device which is attracting considerable attention at the present time is being sold by the Vacuum Muffler Corporation, 154 Nassau Street, New York, N. Y., and known as the Vacuum Muffler. This device consists of two light castings which have upon their inner sides a number of fins which extend outward from a common center. The manufacturers claim that this manifold is thoroughly efficient because of the fact that it does not hold back the gases. It allows a practical discharge through the manifold. The explosion force of the discharge is deflected against a central projection and broken up into numerous small discharges, each of which is separably and evenly expanded to atmospheric pressure and delivered to the atmosphere through the various passages between the fins with hardly any noise.

Imperial Welding Catalog.

The Imperial Brass Mfg. Co., 520 South Racine Street, Chicago, Ill., have issued their latest catalog No. 142, in which is described in detail the full line of Imperial Welding and Cutting Equipment as well as the Imperial Lead Burning Outfits. In this catalog the history of welding and cutting is reviewed and its relation to the model industries is taken up. All of the various industries which utilize the oxy-acetylene welding and cutting apparatus are illustrated and a detailed account is given of the many ways in which welding devices may be utilized. Every reader who is interested in the possibilities of welding or who intends purchasing welding or cutting apparatus or who does storage battery repair work should send for this catalog.

Rico Accessories.

The Rich Manufacturing Co., 1777 Broadway, New York City, are putting out an interesting line of automobile accessories. They issue a small illustrated leaflet which should be in the hands of every automobile owner. This leaflet tells about some of the lines which they market. They show a number of different styles of washing brushes as well as various types of upholstery and cushion brushes and dusters. Special brushes are marketed for wheels and spokes, making a very complete line, altogether. They also illustrate a number of styles of rubber pedal pads, and adjustable foot rests, together with a patented extension pedal said to be the only pedal of its kind now upon the market. The reader's attention is also called to a practical mat for the running board which is easy to clean and may be removed very quickly when not in use.

Acme Automobile Jack.

No automobilist looks forward to tire or car repairs with any degree of pleasure, but at the same time he should be prepared for anything that might happen in this line. He can eliminate some of the trouble by providing himself with a suitable car jack and he can eliminate still more by purchasing a jack fitted with a long handle which eliminates the necessity of crawling beneath the car to put the jack in place.

Such a jack is manufactured by I. S. Spencer's Sons, Inc., Guilford, Conn. This product is termed the Acme Automobile Jack and is provided with a handle which extends 35 inches from the jack. The handle is so arranged that the whole device



Acme Automobile Jack.

may be folded to 18 inches. The jack is designed to lift with ease the heaviest car. All of the moving parts run in heavy grease and are completely covered. The weight of the car is supported upon ten ½-inch ball-bearings.

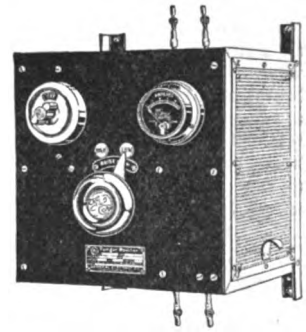
Preventing Grease Leakage.

Many Ford owners are troubled by the leakage of grease from the rear axle housing of their car upon the brake bands, the wheels and the tires. This not only gives an unsightly appearance to the car, but also tends to reduce the braking efficiency. It also wastes grease and now that the country is trying to save, every autoist should do his utmost to prevent any waste of material.

The Shurnuff Mfg. Co., Department D, St. Louis, Mo., manufacture a device which may be placed in the Ford rear axle to prevent the escape of grease. This device consists of three extra high-grade felt washers, one rubber-asbestos washer, retained by proper rings in a steel cup. The felt and rubber washers hug around the axle and press against the housing in such a way that no grease can escape from the differential into the housing. The price is extremely low and the device is well worth investigating either by dealers or car owners.

Tungar Rectifier.

Anyone who intends to charge storage batteries either for themselves in their private garage or for the public in general should investigate the Tungar rectifier manufactured by the General Electric Company, of Schenectady, New York. This



Tungar Rectifier.

device is very compact and easily managed by even the most inexperienced electrician, and is designed for attachment to alternating current lines. The device automatically changes the alternating current to direct, so that one may use it for charging batteries.

Moore Auxiliary Transmission.

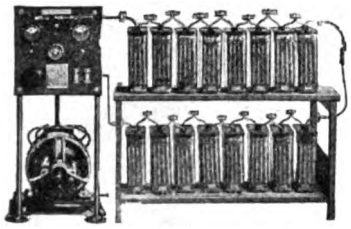
A device which should be of great interest to the Ford car owner is the Moore auxiliary transmission, manufactured by the Tractor Train Company, Los Angeles, California.

This transmission is designed especially for Ford cars which have been fitted with heavy or commercial bodies and provides an extra set of gears which when used in conjunction with the regular Ford gear box gives an intermediate speed and a ratio lower than the regular low speed, as well as a ratio lower than the regular reverse. In other words, this transmission provides a lower ratio beneath all three of the regular Ford speeds. Trucks which cannot be driven over rough or hilly roads on high speed may often be driven on the intermediate, which is had by the application of the Moore transmission. The device is fastened to the Ford rear axle and requires a slight alteration to the propeller shaft mechanism. All necessary parts for alteration are furnished with the transmission which may be applied by anyone accustomed to the use of tools.

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Electric Lighting Plant.

Many garages, machine shops and firms are situated far away from electric lighting systems and it is for these people that the Mayhew Electric Lighting plant manufac-



Electric Lighting Plant.

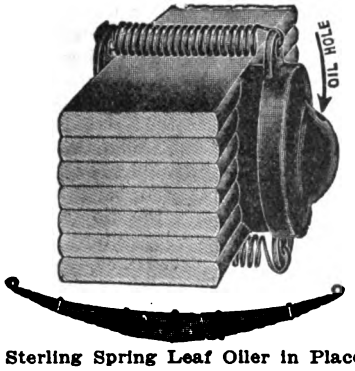
tured by the Mayhew Co., 880 31st Street, Milwaukee, Wisconsin, has been designed. This plant consists of a generator which may be driven from a gasoline engine or any other source of power, a switchboard and a battery of storage cells. The plant is complete in itself and requires a minimum amount of attention. The current generated may be used for lighting or operating farm machinery or in garages for charging storage batteries. Dealers should investigate this proposition for it holds many opportunities. The manufacturers make a special proposition for dealers and jobbers.

A. & H. Vale Tools.

A. & H. Valve Manufacturing Co., Inc., 505-507 West 45th Street, New York City, are putting on the market two valve tools which should be of infinite value to the car owner as well as to the automobile repair man. These tools are designed in such a way that practically any tire valve repair may be made with them. They may be used for removing broken plungers, for recutting both the inside and the outside plunger threads and for removing plungers. They are extremely compact and each tool is designed for a number of operations. The price is so low that one can hardly afford to be without them.

Sterling Spring Leaf Oiler.

In this issue we publish a story dealing with the care and maintenance of automobile springs and the reader will notice that we place special emphasis upon the necessity of proper lubrication, for springs are an important part of the car equipment. We want to call the attention of our readers to the Sterling Spring Leaf Oilers made by the Sterling Mfg. Co., 321 Frankfort Avenue, Cleveland, Ohio, which seem to be very practical and efficient. This device may be attached to the car springs and act entirely



A Sterling Spring Leaf Oiler in Place.

automatically. A frequent filling of the oil reservoir in the device is all that is required once the springs have been cleaned. The oiler consists of a circular metal cover which contains an absorbent material. This cover is retained in place by an oblong locking plate and two small coil springs. The cover forms the reservoir for the oil and this oil is distributed to the various spring leaves by the absorbent material.

Automobile Blue Books.

The 1918 volumes of the Automobile Blue Books are now ready for distribution. These books may be obtained from the publishers or from *Motor Life*, 243 West 39th Stret, New York, N. Y.

A new volume has been added to the series, bringing the total number to eleven. Approximately 415,000 miles of road are covered in detail, together with charts and maps, and every motorist who intends taking his vacation in his machine should have the Blue Book covering that particular territory through which he intends to travel.

A New Factory.

On May 1st, the Dearborn Truck Co. moved into new and larger quarters at 1215-25 West 35th Street, Chicago, Ill. This is a new plant found necessary because of the increased demand for Dearborn truck units. The new property has a frontage of 133 feet and a depth of 455 feet, giving a ground space of approximately 60,000 square feet. All modern machinery has been installed as well as the sprinkler system for fire protection.

Superford Radiators.

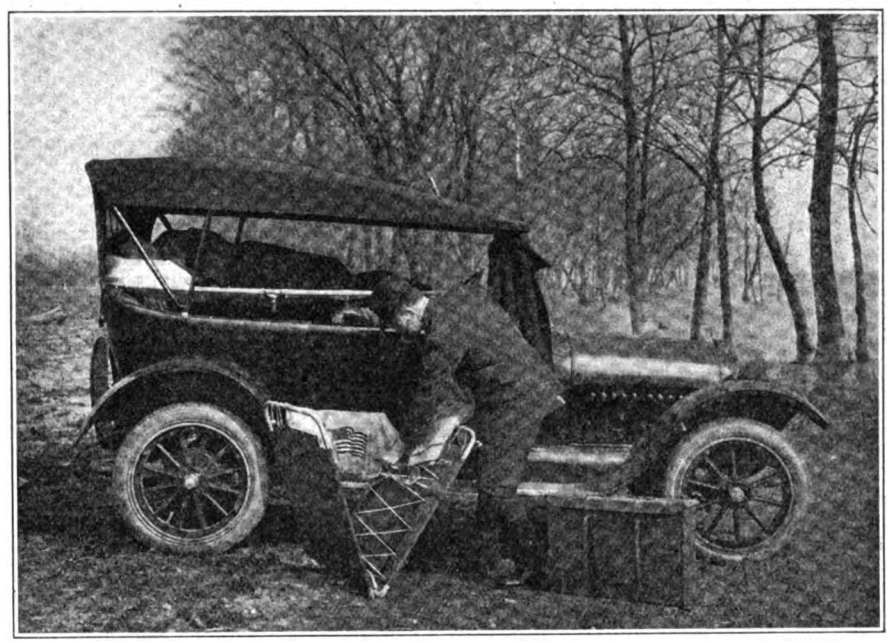
The Superior Lamp Manufacturing Co., of 136 West 52nd Street, New York City, are marketing a radiator for the Ford passenger and commercial cars known as the Superford Honeycomb radiator. These radiators are made with extraordinary skill and care. The inner units are constructed of brass and copper and no steel or sheet iron metal is used. The Honeycomb core is of the same type and design as that used in the Packard car radiator. This radiator is two and one-half inches deep and thus the effective cooling area is much more efficient than that of the ordinary Ford. These radiators are built in two styles, No. 16 (F) is designed to fit Ford cars made in the years from 1909-1912, inclusive. Model No. 18 (F) is designed to fit the 1917-1918 model Ford cars. A special feature of both types is the detachable casings which may be removed should the occasion arise, thus making them of two unit construction.

Samples of these radiators will be shipped to interested jobbers and dealers and we should advise our readers to investigate this type of radiator.

Any Kar-Auto Kot.

The automobile is being used more and more for travelling. The above cut shows the Any Kar-Auto Kot which is manufactured by the Peoria Auto Kot Co., Peoria, Ill. This kot is said to be one of the simplest and most comfortable and inexpensive beds that tourists can carry with them. The kot rests over the tops of the backs of the rear and front seats. One or two can be placed into any five or seven passenger automobile and when the curtains are drawn one is protected from all kinds of weather.

The kot is made of half-inch, galvanized tubing and is six feet long and two feet wide and is hinged in the middle, folding to a small package. It is furnished with a heavy ducking which is laced on the underside. In a few nights out one will save the price of this kot on hotel bills alone. There is no extra work after the kot is once fitted to a car. The bed can be made up ready for sleeping in one minute. The weight of the kot is 15 pounds.



An Any Kar-Auto Kot in Use.

It is said that never before has there been anything along this line that is so simple and practical as the Any Kar-Auto Kot.

Hall Voucher Check.

The garage man cannot afford to waste much time in attending to accounts and very frequently he does not employ any bookkeeper. For this reason he is often put to much trouble in settling various accounts. To prevent such trouble the J. C. Hall Co. of 71 West Exchange Street, Providence, R. I., have designed a voucher check which seems to be of great interest. This check is similar to the ordinary bank check inasmuch as it has the name of the bank, the firm, and space for the amount and payee; but in addition to this it has printed upon its face at one side, space for

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details of the transaction. For different kinds of business the form may be had in different styles, the feature being the blank for itemized figures. Again such a system of taking care of bills is convenient because return checks may be filed in a minimum amount of room and are always convenient for reference. Many firms make a practice of destroying large and bulky bills as soon as they have been paid and using for receipts only the checks returned from the bank. In this way the extreme cost of many filing cabinets is eliminated. The checks may be had in a number of colors printed either upon bond paper or national safety paper. Dealers and garage men should investigate this system.

Rain-A-Way Pad.

A very handy and ingenious accessory is announced by the Badger Manufacturing Corporation of Milwaukee, Wisconsin. This firm was formerly known as the Auto Parts Mfg. Co., and carry a complete line of bumpers, steering wheels, tire carriers and other accessories.

The Rain-A-Way Pad is a small felt pad which is treated with a special solution, and when rubbed over the windshield prevents rain or moisture from blurring the vision.



Rain-A-Way Pad.

It also prevents mist from collecting upon the shield. The pad leaves an invisible film on the glass and this film is said to shed water like a duck's back. If the pad is applied just before it begins to rain it is claimed that the rain drops positively will not collect. Mist or fog are also kept from gathering even on the coldest days. The pad is not greasy, neither does the preparation on the pad evaporate. It may be slipped into one of the side pockets of the car and is always ready for use.

Readers are invited to send for a sample pad.

The 'Official Garage" System.

The "Official Garage" System of the Chicago Motor Club presents an opportunity for the progressive dealer to secure a volume of tourists' trade, season after season. The Chicago Motor Club located at Michigan Boulevard on 29th Street, Chicago, Ill., has a membership of 5,000 automobile owners, and members are furnished with general touring information, together with names of garages and service stations where they may expect rapid service and fair treatment. The motorist is warned not to patronize garages that do not conform with the laws of the club. This club prints each month in their journal "Motor News" a list of official garages, and these garages are required to pay a membership fee of $7.00 together with a sign rental of $12.00 a year. Should any of the garages charge exorbitant prices, their contracts are automatically canceled. The whole plan is co-operative and is designed to protect both the garageman and the traveling autoist.

The Revere Motor Car.

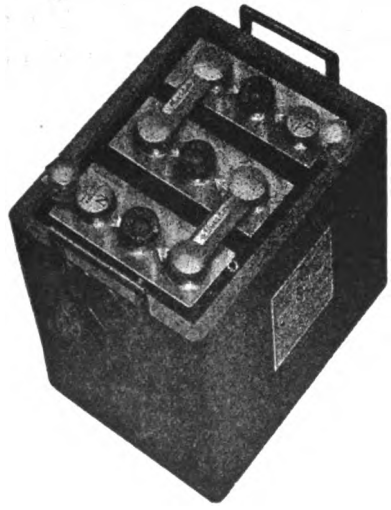
The Revere Motor Corporation, 1638 Monadnock Block, Chicago, Ill., are manufacturing The Revere Motor Car, which is a particularly attractive appearing machine. This chassis is fitted with a Dusenberg racing type four-cylinder engine which develops 103 h.p. The cylinders are all gray iron and aluminum and are cast in block. Aluminum is used in every case where it is possible. All parts of the engine are carefully finished and reciprocating parts are carefully balanced. A pressure feed and splash oiling system is used and cooling is had through a honeycomb type of radiator mounted in an aluminum shell. The body is very attractive and it is designed for speed purposes. Wire or wood wheels may be had, and an extra wheel is mounted on the forward end of the car.

Marko Batteries.

The ordinary storage battery is always a black box of mystery to the car owner as well as many garage and repair men. This need not be so any longer if one purchases a Marko storage battery made by Paul M. Marko & Co., 1191 Bedford Avenue, Brooklyn, N. Y.

This storage battery is extremely interesting because of the fact that the cell covers instead of being made of rubber or composition are made of glass. At a glance, the owner can see the condition inside the cell. He can see how the plates are arranged as well as their condition. He can tell immediately without removing the vent plugs whether distilled water is needed or not. Red arrow indicators project inward from the terminal posts and these indicate the exact level to which the electrolyte should rise in the cell.

Another argument in favor of this battery is that the glass may be kept clean easily by wiping it across with a soft cloth. Internally the construction is somewhat similar to the ordinary type of storage battery. The plates in the Marko cell are composed of pure alloy grid and a paste of selected grade of oxides of lead. The active



Marko Battery.

material is closely bound into place, is relatively hard, yet extremely porous.

The manufacturers claim that Marko plates retain their voltage in heavy discharge and have a longer life as well as a greater capacity than any other plates manufactured.

Raydex Lens.

A unique product is being marketed by the firm known as Raydex, Jamestown, N. Y., which has been termed as the glassless lens. This device is described as being an all-metal cellular device that is placed in the upper half of the head-lamp behind the regular glass door. The reflexor contains more than 9,000 small metal



Raydex Lens.

reflectors or approximately nine square feet of highly polished reflecting surface. When the light of the lamp beams through the Raydex, the device closely resembles a glass lens molded into thousands of tiny figurations. Its object is to deflect those rays which normally rise above the 42-inch level and cause glare and to project them instead upon the roadway where they are wanted. The principle of construction of the Raydex is said to make it transmit 93% of the headlamps candle power according to illuminometer test. It is said that it not only banishes all glare but prevents the lamp from projecting rays above the legal limit.

Klaxon Horns.

We want to call the attention of our readers to the big line of Klaxon horns being manufactured by the Klaxon Company of Newark, N. J. This line includes warning signals suitable for all kinds of cars. They are made in many types either for hand operation or for operation with the storage battery or dry cells. These horns are sturdily made, dependable and trouble-proof, and are within the reach of practically any automobilist's pocketbook.

Mohair Top Dressing.

Very few motorists realize the care which should be used in selecting dressings or polishes for use on the fine finish of a car.

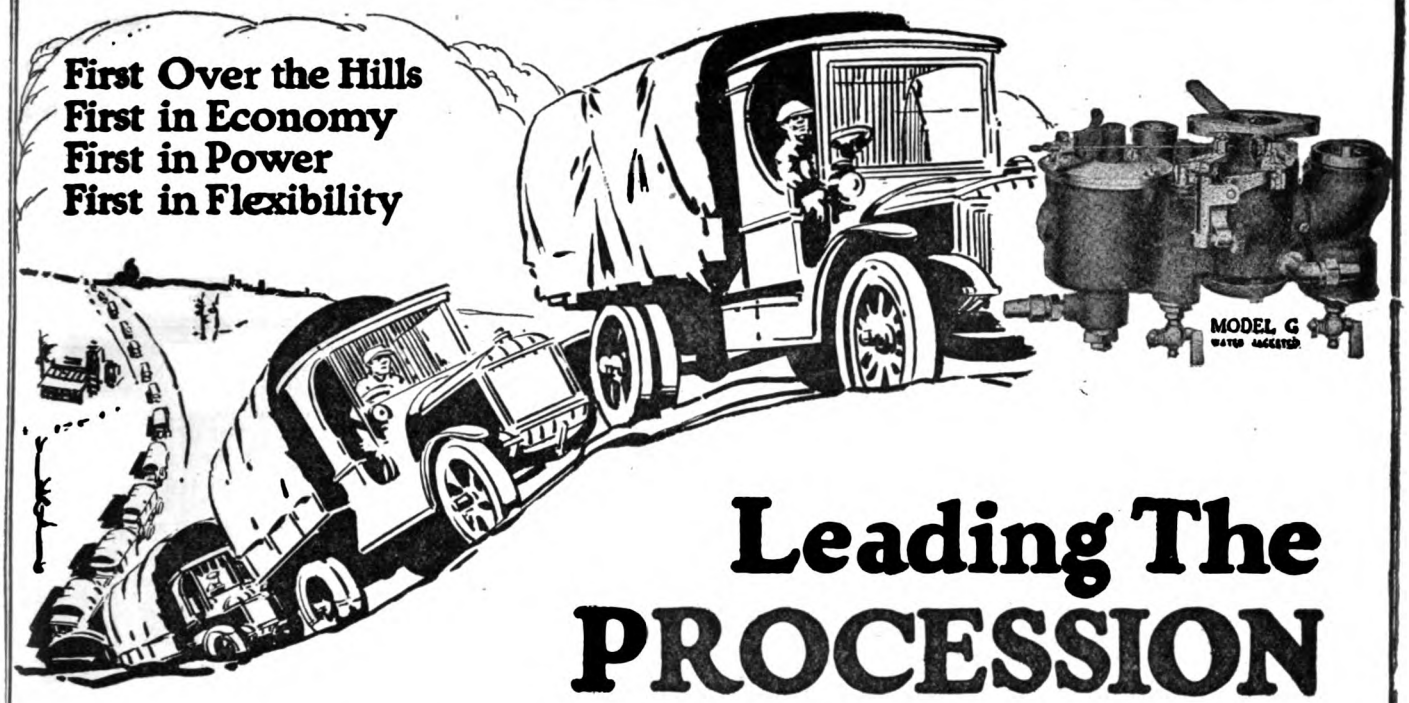
For instance, if a black liquid, put up in a container labeled "Mohair Top Dressing" is purchased, and it gives a uniform black appearance on the top after applying, the average car owner is satisfied that the job is done right, and thinks no more about it.

If, a month or two later, he is caught in a rain storm and the water begins to soak through the top, the usual thought which occurs to him is that the makers of the top should be subjected to some condign punishment for using such poor material, while, if he only knew the facts, his irritation would be directed to what is probably the real source of his trouble.

Mohair cloth is made of two layers of fabric, the outside and the lining. These two are held together by a thin layer of flexible rubber composition. Neither the outside fabric nor the lining is waterproof. The thin rubber insert is all that keeps the water out. Once this becomes porous, the top loses its waterproof qualities, and might just as well be discarded.

It is strange that manufacturers of dressings for mohair tops do not realize that the dressings they offer should be so made as not to injure the fabric as well as to improve the appearance of the top. Yet

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Leading The PROCESSION

SUPREME QUALITY has put the Rayfield Carburetor far in the lead—and maintenance of that quality keeps it there. The Rayfield is *the* "war carburetor." It conserves 30 to 50 per cent more gasolene than any other make. Ask one hundred interested people which they consider the greatest of all carburetors. A big majority will unhesitatingly answer—"the

RAYFIELD CARBURETOR

"The World's Best"

The New Rayfield Special for Ford Cars is the carburetor that gives satisfaction regardless of the going. Whether on hills, in sand or mud, the Rayfield produces the gas in just the right mixture to insure perfect motor performance. A Rayfield under the hood means that you'll "go over the top."

The New Rayfield Thermostat insures the proper temperature for best motor performance under all weather conditions. Quickly installed as a permanent part of the circulating system, it makes any automobile an all year around, efficient car. Write today for full description.

Findeisen & Kropf Mfg. Co.

21st & Rockwell Sts., Chicago

RAYFIELD CARBURETORS

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many dressings for Mohair Tops contain some solvent which will attack or dissolve rubber. Benzine, alcohol, turpentine, gasoline, or various oils are used as solvents



Mohair Top Dressing.

for dressings, all of which will attack rubber. When a dressing, containing one of these ingredients, is applied to a mohair top, the solvent soaks down to the rubber insert and is held in contact with it by the fabric which absorbs a considerable amount.

Even though the dressing dries on the outside, that part next to the rubber insert dries more slowly and unites chemically with the rubber composition. Under the action of some solvents, the rubber insert becomes soft and it pulls away. Others will destroy the elasticity, making it brittle. Then, as soon as the top is folded, it cracks along the lines of the folds, making holes for the rain to enter.

The Frank Miller Company of 349 West 26th Street, New York, has taken this situation carefully into consideration in originating and developing the formula for Frank Miller's Mohair Top Dressing. They claim that they use no materials whatever in its composition which will attack the rubber insert or injure the fabric. It is difficult to produce a dressing of good finish without using some material of questionable action, but Frank Miller's chemist seems to have solved the problem and produced a dressing which, with a single coat, gives a wonderful, soft, silky lustre like new black mohair cloth. This dressing does not fill up the grain of the fabric like a varnish, but retains all its original qualities. It is also lasting and does not require constant reapplication. It is applied easily with a brush. One quart, if properly used, is sufficient to dress a complete top and side curtains of the average size.

Garco Data Booklets.

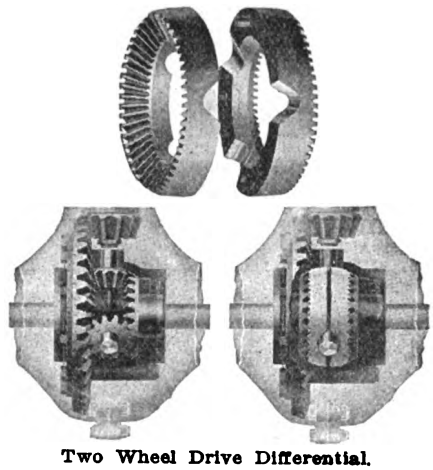
The multitude of different cars on the market and the consequent variations of size in brake lining needed for renewals has been successfully answered in a booklet just published by General Asbestos & Rubber Company of Charleston, S. C. manufacturer of "Garco" Brake Lining.

Listed in this booklet is the name of practically every passenger and commercial vehicle manufactured. The different models of each are listed by year or number. As it now stands the data given regarding the number of pieces of brake lining, the length, width and thickness needed for renewal, is thoroughly up-to-date and it is the intention of the Company to issue revisions from time to time as may be found necessary.

The Garco Brake Lining Data Booklet is of convenient size to be slipped into a vest pocket. It will be gladly sent free of charge to any dealer or repairman requesting a copy. A number of pages have been furnished blank for use in making memoranda and in all this booklet will be found of real, practical value to anyone interested in the brake lining renewal business.

Two Wheel Drive Differential.

The Lewis Differential Co. of 121 Huron Street, Milwaukee, Wisconsin, is beginning to manufacture the product known as the Badger Two Wheel Drive Differential, which they claim gives all of the advantages of the conventional differential, at the same time, however, overcomes all of its disadavntages. For instance, with the ordinary type of differential the power always passes to the wheel offering the least resistance. This is not true of the Badger differential, however, for in this case the power is transmitted to the wheel offering the greatest resistance. This means that the car is held absolutely steady and in line with the direction of the drive. It is said to give positive power when one wheel has traction in cases where the other wheel is upon a slippery surface or is travelling in sand or mud.



Two Wheel Drive Differential.

The installation is very simple and in the case of the Ford car, it is only necessary to take out the three pinion gears, replacing them with the Badger gears, using the same spider.

Anthony Rocker Dumping Body.

Our readers who are interested in special bodies for carrying sand, rock, coal ashes, etc., should investigate the Anthony Dump Rocker Dumping Body manufactured by the Anthony Co., Inc., Streator, Ill. These bodies are designed for application to Ford machines which have been adopted to carry loads of one ton or over. The body is automatic in action, the dumping being accomplished simply by releasing the latch. The centre of gravity of the load automatically consists in tipping the body backward. Upon disposal of the load, the body is instantly restored to the horizontal position. It is possible to arrest the body movement at any angle and hold the body in that position.

In the same manner the body movement may be so retarded that the final dump is accomplished easily and without excessive strain to any of the parts. In connection with this feature, road material, such as crushed rock, gravel, cinders, can be spread by holding the body at the proper angle and opening the tail-gate a certain amount. The full angle of dumping is greater than that secured in many bodies and varies from 48 to 50 degrees. For accomplishing any of the operations, the operator need not leave his seat. The body is well designed and the weight is ahead of the rear axle.

Standard Motor Pep.

A product has been brought out recently by the Utilities Co., Citizens Bldg., Cleveland, Ohio, which is claimed to energize gasoline. The manufacturers claim that when Motor Pep is used, car mileage is increased and the engine delivers 20% or more power than usual. This preparation is said to prevent the formation of carbon in the cylinders. It is put up in tablet form and dissolves readily in the gasoline, leaving no sediment. It is claimed that the preparation will not damage the carburetor, the cylinders, the valves, the tank, the pipe lines, or any part of the engine in any way. A special proposition is made to dealers, jobbers, garages, agents and anyone interested, who should write for samples. The product is guaranteed to produce results as claimed, or the money is refunded.

Helios Magnetic Lamp.

The Carbo Gas Co., Gardner Bldg., Toledo, Ohio, intend to put on the market, in the very near future, a product which is entirely new to the automobile industry. This product is termed "The Helios Magnetic Lamp," and is unlike any lamps now in use. The energy for lighting is derived from magnetism and the light is produced by a gas, instead of a filament, as in ordinary lamps. The device is very convenient and the Company expects to lease it at a nominal charge instead of selling it. The prices are low and the lights are refilled or recharged, as it is termed by the Company, who maintain all repairs at their own expense, charging only for the rental of the



Helios Magnetic Lamp.

device. The lamp lends itself to all sorts of lighting as well as automobile work and should be of great utility upon farms or in shops where electricity is not available.

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Cork Insert

Transmission Lining For FORD CARS

—Stops the grabbing and slipping—the vibration and chattering.
—Requires less pressure on the pedal.
—Makes the Ford brake BRAKE.
—Saves the Ford rear end.
—Outwears several sets of ordinary linings.

$3 per set of 3

Keeps the Fan Fanning!
Cork Insert Fan Belt for Fords

The ordinary fan belt used with Fords is inefficient because of slippage—estimated at 25 to 50 per cent. Cork Insert Fan Belts stop this slipping—keep the fan turning with the speed of the engine—cut down the tendency to overheat. They retain their no-slip efficiency to the end of their long service.



$1
for 1917 Fords
85c for earlier models

Advance Automobile Accessories Corporation, Dept. F5-1, 56 E. Randolph St., Chicago
Makers also of Cork Insert Brake Linings for all passenger cars and trucks

Dealer's Coupon Check and Mail Today!

Advance Automobile Accessories Association
Dept. F5-1. 56 E. Randolph St., Chicago

Enter our order for:
☐ Dozen sets of Advance Cork Insert Transmission Linings for Fords.
☐ Dozen Advance Cork Insert Fan Belts for 1917 Fords.
☐ Dozen Advance Cork Insert Fan Belts for 1916 or earlier model Fords.
Deliver through jobber mentioned below.

Name.....
City..... State.....
Jobber's Name.....

Ford Owner's Coupon Check and Mail Today!

Advance Automobile Accessories Association
Dept. F5-1. 56 E. Randolph St., Chicago

Enclosed find $..... Send me:
☐ 1 set Cork Insert Transmission Linings for Fords.....$3.00
☐ 1 Cork Insert Fan Belt (for 1917 Ford)..... 1.00
☐ 1 Cork Insert Fan Belt (for 1916 or earlier Ford model)..... .85

Name.....
City..... State.....
Dealer's Name.....

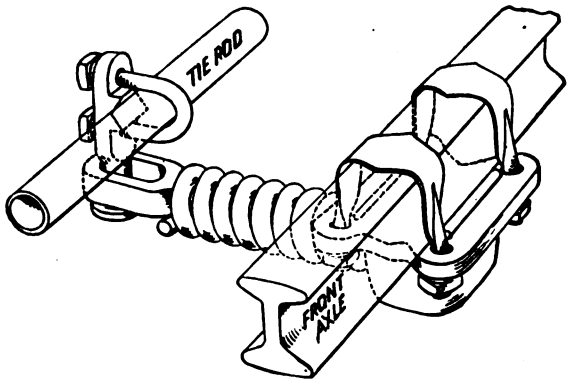
Dealers!

Ask your jobber's salesman what he thinks of Cork Insert. Ask him how it is selling with other dealers. He will tell you it's the livest thing that has come on the market for many a day. It's repeating all the way down the line because it does better work and gives longer service. You do yourself and your customers a good turn when you push Cork Insert.

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The D. & O. Anti-Wobbler.

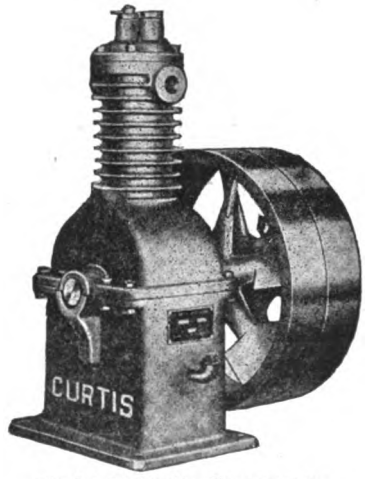
Many Ford car accidents are caused by the driver losing control of the car. This usually means that he is not strong enough to keep the front wheels in line or turn them in the direction in which he desires to go. The D. & O. Anti-Wobbler sold by the G. H. Dyer Co., 155 Brookline St., Cambridge, Mass., is said to eliminate this trouble. This device is said to make the Ford car steer as easily and as smoothly as any big car. It also prevents rattling of the tie rod. It consists of a large brake which is mounted upon the front axle, a large coil spring and a special pivot lock upon the tie rod.



The D. & O. Anti-Wobbler.

Curtis Compressor.

We reproduce herewith a picture of the Model B Curtis Compressor, manufactured by the Curtis Pneumatic Machinery Co., Railway Exchange Bldg., St. Louis, Mo., a pump which is designed to be driven from any source of outside power by a belt. This model is fitted with a tight and loose pulley and so arranged that it may be started against full tank pressure without any danger of burning out the drive motor.

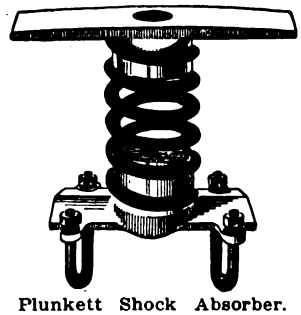


Model B Curtis Compressor.

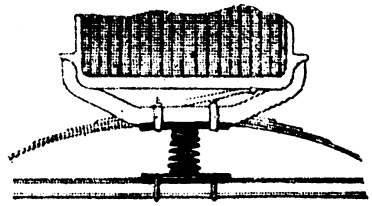
The valves are prevented from dropping into the cylinders by a special safety device and may be inspected without removing the cylinder head. The cylinder may be removed without disconnecting any piping. While the device is amply lubricated by oil in the crank case, it is said that no oil can find its way into the storage tank. Anyone who intends to install air pressure machinery in the garage or service station should investigate the complete line of compressors, tanks, etc., manufactured by this company.

Plunkett Shock Absorber.

Every Ford car owner realizes that he may be caused considerable annoyance by the breaking of the front spring. Not only annoyance, but the breaking of a spring might mean the damage of the engine or the straining of other parts of the car, and for this reason he should do everything in his power to prevent such breakage. It is for this purpose that the Plunkett Shock Absorber has been designed. This device is made by the Plunkett Shock Absorber Co., 323-5-7 Washington Street, Brooklyn, N. Y., and is designed to be placed between the lower leaf of the front spring and the axle. Located in this position, the device absorbs the shock before it reaches the spring and also serves as a support for the central portion of the springs at the point where the greatest strain occurs. To a certain extent this device is an auxiliary spring. It prevents spring breakage caused by sudden dropping of the wheels, and it is said to add to the riding qualities of the car. The device is installed very easily and at the price, one can hardly afford to be without it.



Plunkett Shock Absorber.



Plunkett Shock Absorber Applied.

Six New Booklets.

Paint and Chemical manufacturers owned and controlled by the E. I. du Pont de Nemours & Co. of Wilmington, Del., have just issued six new and attractive booklets on the various products of their manufacture. These booklets may be had by writing this concern.

The first one gives a list of chemicals, etc., comprising the Blue Ribbon Line manufactured by the Company. It tells the trades and industries in which they are used and in many cases states how they are used. The second booklet describes the house and other paints manufactured, and includes a scale comprising the various color companies for use of house exteriors. The third booklet takes up the subject of Harrison Oil Stains.

Other booklets take up the products known as Harrison Automobile and Carriage Paint, Harrison Porch Chair Enamel and various wood stains for different kinds of work.

Scored Cylinders.

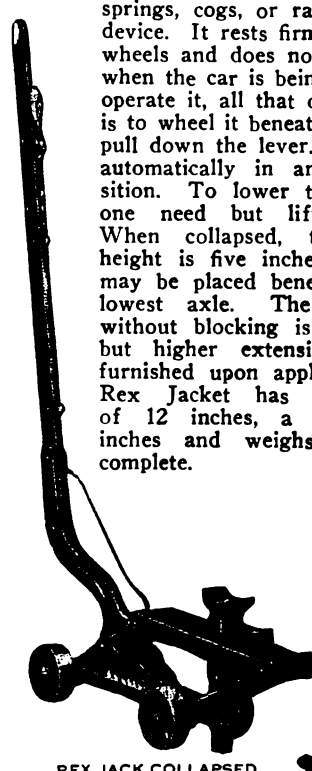
It is quite possible that many automobile owners do not fully realize the true cause of so much of their engine trouble together with the corresponding loss of time and money which these troubles carry with them. The gasoline engine is no better than its cylinders and pistons. One of the two extremes is usually present in automobile engines. First the using of a very large amount of cylinder oil and gasoline; second, the using of very little cylinder oil, but a large quantity of gasoline. Both of these troubles may be traced to poorly fitting pistons or scored cylinders.

In many cases the scoring of cylinders can be traced to the leakage of gasoline past the pistons and the consequent dilution of the cylinder oil. As a general rule there is but one positive cure for the evil, and that is regrinding of the cylinders and the installation of over-size pistons.

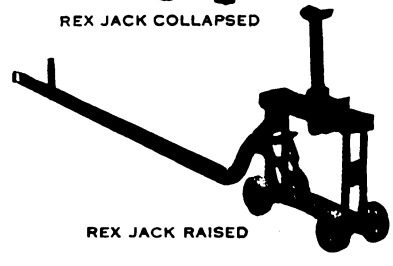
Butler Mfg. Co. of Indianapolis, Indiana, have made a special study of this type of work and have made careful tabulations covering the proper compression and ring construction necessary for fitting, in reboring engine cylinders. They have standardized their prices and carry a large line of pistons, rings and other equipment in stock. They are equipped to regrind or rebore worn cylinders and restore the engine to its original efficiency.

Rex Automobile Jack.

The two illustrations show how the Rex jacket looks when it is in two positions, raised and collapsed. This device is made by the B. & M. Manufacturing Company, 5810-5814 Wood Street, Chicago, and is constructed of heavy material and said to be absolutely safe in operation. There are no springs, cogs, or ratchets in this device. It rests firmly upon four wheels and does not tip or sway when the car is being raised. To operate it, all that one has to do is to wheel it beneath the car and pull down the lever. It will lock automatically in any lifted position. To lower the car again one need but lift the lever. When collapsed, the extreme height is five inches, so that it may be placed beneath even the lowest axle. The higher lift without blocking is 20% inches but higher extensions may be furnished upon application. The Rex Jacket has a wheelbase of 12 inches, a width of 5 inches and weighs 47 pounds complete.



REX JACK COLLAPSED



REX JACK RAISED

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For Better SERVICE

For Quicker PROFITS



WEAVER UNIVERSAL Tire Changer

HANDLES OLD RUSTED TIRES AND RIMS AS EASILY AS NEW ONES

Make Your Garage or Vulcanizing Shop the Leader in Your Town

Install a Weaver Tire Changer and a Weaver Tire Spreader. Advertise the fact to your customers. Take them through the shop and **show** them these two efficient pieces of Weaver Garage Equipment in operation. And then tell them Weaver Equipment is what enables you to do their tire work BETTER, CHEAPER and QUICKER than anyone else can do it the old way.

Weaver Service of this kind you will find pays—BIG. It acts as a trade magnet. It gives the kind of hurry-up service that owners demand.

The Weaver Tire Changer saves work for your men. No more "fighting" for an hour or so with a rusty or battered rim.

No Injury to Tires or Rims

Your customers will also appreciate having their tires and rims handled by SMOOTH ROLLERS instead of with a sledge hammer and cold chisel.

Every operation is performed by rollers—there is no springing or "battering" of rims and no cutting or marring of tires.

Will Handle Any Rim

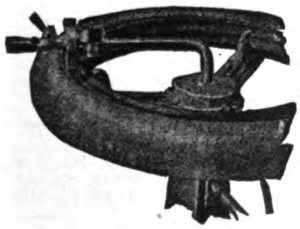
Any size or style of rim or pneumatic tire can be handled on this "Universal" Tire Changer. The adjustments are quick and simple. Weight 250 lbs., a REAL machine. The price will agreeably surprise you. Send for catalog of complete line.

WEAVER MFG. CO.

Springfield, Ill.



"Rolling" Bead Out of Solid Clincher Rim.



Separating Lock Rings by Roller Pressure.



Detachable Plate



WEAVER Tire Spreader for the Quick and Convenient Inspection of Tire Casings



Gooseneck Attachment "Rolling" Tire off of Solid Rim.



"Rolling" Tire onto Solid Rim—Clincher or Straight Side.

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"HOW TO WASH AUTOMOBILES"

Pocket edition booklet of valuable information to owners, chauffeurs, garage proprietors and their help. Free to those who write for it.

MURPHY VARNISH COMPANY
NEWARK CHICAGO

The Helix.

The Greenfield Tap and Die Corporation has just issued the first number of its new factory magazine, entitled "The Helix," a magazine which is printed for the benefit of the employees of the Company and will be published monthly. The first issue comprises 16 pages and contains many interesting shop notes together with a view of the factory and other illustrations. Mr. J. T. Seller, Secretary of the Corporation and head of the Welfare Department, is in charge of the paper, which has been greeted with a great deal of interest and enthusiasm by the members of the various factory branches.

New Woodworth Booklet.

A little book which should be in the hands of all of our readers is being distributed free of charge by the Woodworth Mfg. Corp. of Niagara Falls, New York. This 16-page booklet is entitled, "Motor Car Accessories Worth Knowing," and upon these pages are described the full Woodworth line, comprising the automobile tires and the well-known Woodworth steel studded leather tread, two products which have been on the market for several years and are well known to the trade. In addition to these there are illustrated many other accessories such as Easyon Non-Skid Chains for passenger and truck tires; Easyon Solid Tire Grip for trucks, Woodworth Spring covers and lubricators, Woodworth No-Stretch, No-Slip Fan Belts; tire boots, inner sleeves, and other items. We would advise all of our readers to write for this book for we feel that it would be money in their pockets to do so.



New Woodworth Booklet.

Gabriel Snubbers.

It is generally conceded that a car rides much easier when fitted with shock absorbers, and car owners are beginning to realize that shock absorbers not only make for comfort, but increase the life of the car. Owners who desire to install such devices upon their car may well consider the advisability of installing Gabriel Snubbers, manufactured by the Gabriel Manufacturing Co., 1411 East 40th Street, Cleveland, Ohio. These devices are designed to check the rebound and consist of a coil spring which automatically takes up the slack in a heavy belt attached to the axle. When the slack in the belt has been taken up the belt may be pulled out slowly from the device, but it is said to be impossible to pull the belt out quickly.

Form-A-Gasket.

A new gasket has appeared on the market that should prove of exceptional value to the trade. It is called Form-A-Gasket and is manufactured by the auto accessory firm of Constant A. Benoit, Brooklyn, N. Y.



Form-A-Gasket Container.

Permatex Form-A-Gasket is a gasket in paste form that can be smoothed-on with your finger. The manufacturers state it dries quickly, producing a solid layer of heat resisting material that will stand exceptionally high pressure and is gasoline, kerosene, oil and water-proof.

The manufacturers claim that Permatex Form-A-Gasket not only produces superior results on cylinder heads, carburetors, manifolds, crank cases, gear cases, and similar parts, but it saves much time in motor assembling, and saves much gasket material that otherwise is wasted.

Permatex Form-A-Gasket is offered in three sizes, ¼ pint, 1 pint and 1 quart cans. Attractive lithographed pasters, and four-color poster designs accompany all shipments. Write your jobber for prices, or direct to Constant A. Benoit, Brooklyn, N. Y.

Lyknu Polish.

The Lyknu Polish Manufacturing Company of Pittsburg, Pa., manufacture an automobile polish which is said to eliminate all kinds of grease and they also include in this category, elbow grease, for they claim that with Lyknu, the polishing of an automobile is made extremely easy. A piece of cheesecloth is moistened with this product and the surface is rubbed with a cloth until it is dry. This is said to bring back the original lustre of the finish and restore the appearance of the machine.

Hexall Products.

New machines are being added to the plant of R. F. Sedgley to meet the great demand for Hexall Ratchet and Socket Wrenches and Baby Hammerless Revolvers. Hexall wrenches are far behind on delivery owing to the increasing sales, and customers have been advised to place orders as far in advance of their need as possible.

Since the new patented one-piece main and trigger spring has been put in the Baby Hammerless the demand has steadily increased until it is no longer possible to keep customers supplied even with immediate requirements.

The new machines are designed to do many operations that are now being done by hand, and in this way will help out on the labor question as well as getting the articles mechanically perfect.

The Hexall Wrenches and Baby Hammerless revolvers are now being sold to the jobber on the Pacific Coast by McDonald & Linforth, 739 Call Building, San Francisco. The Gray-Heath Co., 1440 Michigan Avenue, Chicago, is distributing the wrenches along the Mississippi Valley.

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Classified Advertisements

Under this head will be printed advertisements of **Second Hand Cars Wanted or for Sale, Accessories of any kind Wanted or for Sale, Shops for Sale or Rent, Situations or Help Wanted, Second Hand Tools or Machines for Sale or to Exchange,** at the uniform price of **five cents a word,** including the name and address, for each insertion, payable in advance. **No advertisement will be inserted for less than 75 cents, however small.** Remittances may be made in postage stamps or in any convenient way.

Special rate of 30 cents per nonpareil line for each insertion if taken for 12 consecutive times.

Classified Advertisements

Address MOTOR VEHICLE PUBLISHING CO., 71-73 Murray Street, New York.

Tires

TIRES At Wholesale

3,500 miles guaranteed. We have the cheapest, highest grade, LONGLIFE and RELIABLE tire in the world.

PRICE LIST

Size	Plain	Non-Skid
30x3	$7.95	$8.75
30x3½	10.30	11.50
32x3½	12.05	14.00
33x4	16.85	19.00
34x4	17.25	19.75
35x4½	24.25	27.00
37x5	28.00	35.00

All other sizes on request.

20% deposit required on C. O. D. orders.

Mail your order now and save 25% to 50% on your tire bills.

M. LIBEN & CO.
205-A West 48th Street
New York City

Factory Seconds

Attractive Discounts to Dealers on All Makes.

Montford
Miller
Firestone Cord
General, Etc.

Write for Quotations

JAFFE BROS.
260 West 54th Street New York City

TIRES 40 to 65%

Greatly reduce prices of surplus stock. New fresh standard makes. Not rebuilt or junk. Guaranteed 4,000 miles. We pay express. 40% off on exchanging old Ball Bearings. We can beat any price on same quality.

AUTO ECONOMY CO.
223 West 49th St., New York

Tires

BUY EARLY AND SAVE MONEY

Double Tread Tires and Tubes

GUARANTEED

Come to the Tire Clearing House—here are prices—clear cut and plain as daylight. We buy wholesale the best "try out" Tires—and you get the benefit—you want truthful tires, and truth is never crushed to earth if given a square deal—real truth is puncture proof—

SO ARE OUR TIRES.

Size	Plain	Non-Skid	Tubes
28x3	$4.40	$4.95	$2.00
30x3	5.50	6.05	2.00
30x3½	6.60	7.15	2.50
32x3½	7.15	7.70	2.75
34x3½	8.25	8.80	3.00
30x4	7.70	8.25	2.75
32x4	8.80	9.35	3.00
33x4	8.80	9.90	3.50
34x4	8.80	9.90	3 50
35x4	9.90	11.00	3.60

For (non-skid) sizes up to 32x4, 50c extra; all other sizes $1.00 extra.
For rebuilding your old tires we charge you 60% of the above prices.

Get your order in quick for goods listed here—by all means get in touch with us for further information about our special process—it means money in your pocket. Get in right—write today—yes—today.

Look up rating in Dunn's or Bradstreet's.

Size	Plain	Non-Skid	Tubes
36x4	$9.90	$11.00	$3.60
32x4½	9.90	11.00	3.75
34x4½	11.00	12.10	4.00
35x4½	11.00	12.10	4.10
36x4½	11.00	12.10	4.25
37x4½	12.10	13.20	4.35
34x5	11.00	12.10	4.50
35x5	13.20	14.30	5.00
36x5	13.20	14.30	5.00
37x5	13.75	14.85	5.00

B. LIBEN & COMPANY
261-A West 54th Street NEW YORK CITY 112-A East 110th Street
THE HOME OF DOUBLE TREAD TIRES

Exceptional Values

IN

DOUBLE CHAIN STITCHED TIRES

Size	Plain	Non-Skid	Size	Plain	Non-Skid
28x3	$4.50	$5.00	35x4	$10.00	$11.00
30x3	5.50	6.00	36x4	10.00	11.00
30x3½	6.50	7.75	34x4½	11.00	12.00
32x3½	8.00	9.00	35x4½	11.00	12.00
31x4	9.00	10.00	36x4½	11.00	12.00
32x4	9.00	10.00	37x4½	11.00	12.00
33x4	9.00	10.00	35x5	11.00	12.00
34x4	10.00	11.00	36x5	12.00	13.00
			37x5	12.00	13.00

Have your own tires Double Treaded by the same process. Our charges are only 40% off the above mentioned prices.

Send your order to our nearest office.

LEON JAFFESS, Inc.
252 West 55th Street, New York City
6106 Euclid Avenue, Cleveland, Ohio

Double Tread Tires

Notice Our Prices Before Going Elsewhere

PRICE LIST

Size	Plain	Size	Plain
30x3	$5.00	35x4	$9.00
30x3½	5.50	36x4	9.50
32x3½	6.50	36x4½	10.00
32x4	7.00	36x5	10.00
33x4	7.50	37x4½	10.00
34x4	8.00	37x5	10.50
34x4½	8.50		

For Non-Skid, 50 cents more on all sizes.

We Carry a Full Line of New and Used Tires & Tubes

GINSBERG & BERKOWITZ, Inc.
236 WEST 48th STREET, NEW YORK

PRICE WRECKERS

Double Tread Tires with Double Lock Stitch

30x3	N. S.	$5.50	34x4½	N. S.	$8.50
30x3½	"	6.50	35x4	"	9.00
32x3½	"	7.00	36x4	"	9.50
31x4	"	7.25	36x4½	"	10.00
32x4	"	7.25	36x5	"	10.00
33x4	"	7.50	37x4½	"	10.00
34x4	"	8.00	37x5	"	10.00

We carry a full line of Firsts and Factory Blemished Tires and Tubes at moderate prices.

ROYAL TIRE EXCHANGE
282 Halsey St., Newark, N. J.

TIRE BARGAINS. — Firsts, Seconds, and Factory Blemished Tires and Tubes. Our prices are below the market—see for yourself. Write for price list.
Manufacturers Surplus Tire Co., 789 Seventh Avenue, New York

DEALERS AND BUYERS
Send for prices on Good Factory Seconds.
STAR RUBBER COMPANY
1771 Broadway Tel. 123 Columbus New York City

INSYDE TYRES,
inner armor for automobile tires. Double mileage. Prevent punctures and blowouts. Details free. Agents wanted. Big profits.
AMERICAN ACCESSORIES CO., Dept. AD3, Cincinnati, Ohio

Personal

PERSONAL—KIDNEY TROUBLE is not only annoying, but frequently leads to serious conditions. Send address for simple and immediate help. G. A. Stokes, Mohawk, Florida.

Rectifiers

RECTIFIERS to charge from A-C circuit 1 to 8 ignition lighting or starting batteries at one time, $12.00 upward. American Battery Co., 1136 Fulton St., Chicago, Ill.

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Tires

FORD TIRES

30 x 3½

$8.50

BRAND NEW — IN WRAPPERS

Unguaranteed

Name and Serial Numbers On

Send Your Orders First Letter

JANDORF TIRE CO.

1763 Broadway, New York

Cylinders Reground

ATTENTION

Those Requiring the Very Best in

CYLINDER GRINDING

fitting with light grey iron pistons, leakless rings, hardened and ground pins, our work has no comparison with the ordinary, now obsolete heavy type pistons and rough boring jobs. We grind our cylinders to one-half thousandths, mirror finish. We grind our pistons on the highest grade machines to fit, two and one-half thousandths clearance. We use the McCadden leakless piston rings. Work all reassembled ready for installation. All work positively guaranteed.

Patterns and castings in stock for every make of motor.

McCADDEN MACHINE WORKS, Inc.

St. Cloud, Minnesota

CYLINDER REGRINDING PISTONS, RINGS and PINS

Quality work. Get our prices.

BUTLER MANUFACTURING CO.

ESTABLISHED 1897.

1121 EAST GEORGIA INDIANAPOLIS

CYLINDER GRINDING on automatic machinery by skilled mechanics at prices that will interest you. Gears, axles, valves and parts of all kinds made of high grade alloy steel. Send us your worn or broken parts and we will replace them. Oxy-Acetylene Welding. Cracked cylinders a specialty. Adapt Machinery Co., 1632 So. Wabash Ave., Chicago, Ill.

Radiators and Lamps

WE REPAIR Lamps, Radiators, Windshields and Fenders, of every description. Largest repair plant in New York. Great accessory bargains on hand for immediate delivery.

HUDSON AUTO LAMP WORKS

1650 Broadway, New York City

Instruction

AUTOMOBILE INSTRUCTION—The West Side Y. M. C. A. Automobile School gives a practical course in shop and road practice in four or eight weeks, day or evening. Provision made for out of town men. 322 West 57th St., New York City.

Piston Rings

PISTON RINGS

QUALITY SUPREME

PRICES RIGHT

✦ ✦

All sizes in stock

✦ ✦

Interesting proposition for agents

✦ ✦

Houpert Machine Co.

355 West 52nd Street

New York, N. Y.

Auto Accessories

IGNITION, STARTING-LIGHTING

Genuine Parts only used in repairs.

K-W Magnetos -:- Zenth Carburetors

CLEVELAND IGNITION CO.

2026 E. 22nd Street CLEVELAND, OHIO

NOTICE, REPAIRMEN!—If you repair Ford cars you need our line of cylinder reamers, motor stands, quick-raising jacks, portable hoists, straightening presses, speed tools and wrenches. Geneva Machine Works, Geneva, Indiana.

VULCANIZING Auto Tires is a growing business. Our plants are easy to learn to operate. Cat. is free. You save 30%. Instruction book on vulcanizing 75c. Equipment Co., 304 Eighth St., Cincinnati, Ohio.

Wanted

GARAGE PRESS WANTED—Must be cheap and in good order. Nantz Auto Co., Samson, Ala.

Gears and Parts

STODDARD DAYTON PARTS

Pullman & Regal Parts

rear axle bevel gears and pinions

These are all new parts.

THE DAYTON AUTO PARTS CO.

351 West 52nd Street, New York City — 1623A McGee Street, Kansas City, Mo.

SAVE 50% TO 75% ON PARTS—Parts for Pope-Hartford, Columbia, Reo, Buick, Overland, Chalmers, Mitchell, Thomas, Oldsmobile, Maxwell, Stoddard-Dayton, Stevens-Duryea, Corbin, Cadillac and all others. Eiseman, Splitdorf and Remy magnetos, $5.00 to $10.00. Bosch high tension magnetos, $15.00 to $25.00. Also the Mea, Connecticut National, U. & H. and K. & W. magnetos in stock. Springs, wheels, axles, etc., for all cars. Connecticut Auto Parts Co., Inc., 1070 Main St., Hartford, Conn.

Magnetos and Batteries

Hecht's Magneto Exchange

Dealers in Magnetos of all Makes.
Lighting Systems and Self Starters.

Expert Repairing of All Makes.

Express your Magneto, Starter and Generator to us. Same will be repaired and returned same day as received.

Distributors and Service Station for

Swiss, Heinze, National and Michigan Magnetos

— Also —

Esterline Generators, Norma Ball Bearings and all kinds of Parts carried in stock for all makes of Magnetos

230 WEST 49th STREET NEW YORK CITY

For Sale

PYRMA ALUMINUM HEEL PLATES cover or prevent unsightly holes in floor board coverings, 75 cents each. These plates and PYRMA ALUMINUM MATTING for sale by all up-to-date dealers. Metallic Automobile Matting Co., Rochester, N. Y.

FOR SALE—Baby chicks, quality stock. Rocks 14c, Reds 15c, S. C. W. Leghorn 13c, prepaid, in lots of 50 or more. Pedigreed Airedale pups. E. R. Hummer & Co., Frenchtown, N. J.

FOR SALE—Best equipped and best paying garage in Western New York. Located on main State Road—size 40 x 120. All machine tools and about $3,000 worth of stock and tools. Price for building and all equipment, $9,000. Two-thirds cash, time on balance. Possession at once. L. F. Howden, Fillmore, N. Y.

TO RENT, GARAGE—Two good rooms 25x 75 feet each. Good location at Mt. Vernon, Mo., to rent for garage. Further particulars write to J. W. Nisbeth, Bevier, Mo.

FOR RENT OR SALE—Garage, also suitable for other mercantile purposes, in county seat town with only one other garage; former operator's (now in army) tools can be secured reasonable; will trade for clear farm land of equal value. Mrs. Anna M. Hokanson, Wheaton, Minn.

FOR SALE—Riverside Garage and Machine Works, an established business, with full equipment and a complete stock on hand. Called for service. 206 W. 6th St., Lawrence, Kas.

Patent Attorneys

PATENTS SECURED—C. L. Parker, Patent attorney, McGill Building, Washington, D. C. Inventor's Handbook upon request.

PROTECTIVE PATENTS PROCURED PROMPTLY—Blue Book on Patents sent on request. Trade-Marks Registered. Robb & Robb, 288-292 Southern Building Washington, D. C.

RALPH N. FLINT, M. E.—Attorney-at-law in Patent Causes, late Assistant Examiner Internal Combustion Engine Division, U. S. Patent Office. Specialist in Internal Combustion Engine Cases. 2 Rector Street, New York, N. Y.

WANTED—AN IDEA! WHO CAN THINK of some simple thing to patent? Protect your ideas; they may bring you wealth; write for "Needed Inventions" and "How to Get Your Patent." Randolph & Co., Dept. 251, Washington, D. C.

IMPROVEMENTS WANTED—Send for free bulletins and advice. Book, "Inventions—Patenting and Promoting," free. Lancaster and Allwine, 212 Ouray Bldg., Washington, D. C.

PATENTS THAT PROTECT—Advice and books FREE. Highest references. Best results. Promptness assured. Send drawing or model for search. Watson E. Coleman, Patent Lawyer, 624 F Street, Washington, D. C.

Subscribe to the "Automobile Dealer and Repairer," $1.00 Per Year.

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THE CURE

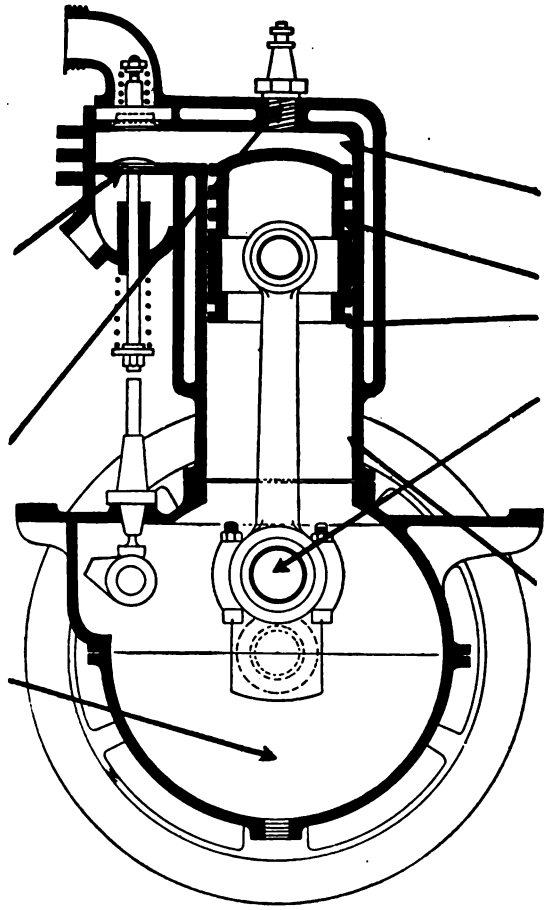
For Engines with These Symptoms

CARBON WEAR

Collection of carbon, not allowing valves to seat; also in combustion chamber, causing pre-ignition, loss of power, and a hot engine.

Fouled spark plugs cause skipping. Gasoline leaks into cylinder cutting lubricating qualities of oil, causes excessive wear.

Oil turns black from being burned, and does not give correct lubricating qualities.



Cylinders larger at the top and and out of round.

Compression and hot gases escape, burning oil, destroying life of piston rings and engine.

Excessive gasoline and oil consumed. Bearings do not stand up.

Dry and pin-scored cylinders are results.

HAVE THE

CYLINDERS REGROUND

AND FITTED WITH

NEW PISTONS, RINGS, PINS

Largest Exclusive Cylinder Regrinding and Oversize Piston and Pin Shop in the Middle West

1121 E. Georgia St., BUTLER MFG. CO., Indianapolis, Ind.

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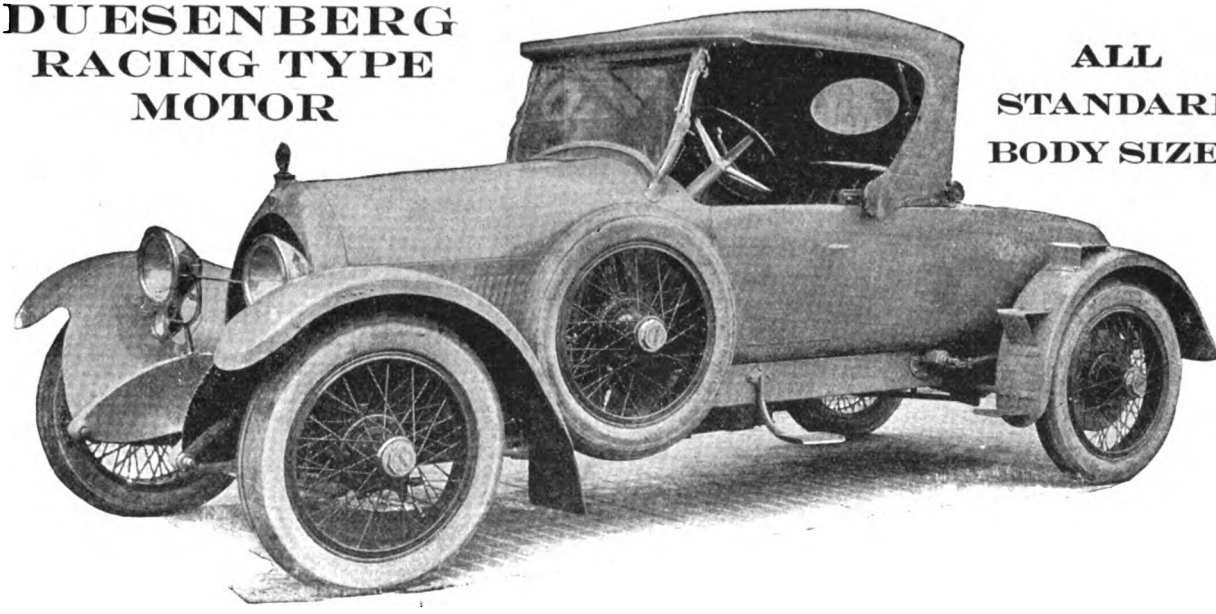
The ReVere Motor Car

Designed by—

Gil. Anderson Adolph Monson and Tom Rooney—

DUESENBERG RACING TYPE MOTOR

ALL STANDARD BODY SIZES



SPECIFICATIONS—ReVere Chassis

ENGINE—Duesenberg Racing Type. Four-cylinder, 4⅜ in. bore, 6 inch stroke. Develops 103 H. P.

Cylinder—Gray iron and aluminum, cast en bloc.

Crankcase—Aluminum, crankshaft chrome nickel steel, finished all over, counter balanced.

Connecting Rods—Drop forged, heat treated chrome nickel.

Pistons—Special aluminum alloy. All integral moving parts hardened and ground; tungsten steel valves. Oiling system, pressure feed and splash.

Magneto—Bosch high tension.

Clutch—Multiple dry disc; discs faced with non-burn composition.

Starting and Lighting System—Electric Bijur.

TRANSMISSION—ReVere design. Four speeds forward and one reverse. Direct drive on fourth. Unit power plant.

Gears—Special alloy steel, hardened and ground on bearing surface; shafts on large ball bearings.

Transmission—Supported on three points, assuring absolute alignment of engine and transmission, drive to rear axle through two universal joints; torque taken up through two rods each side of propeller shaft.

REAR AXLE—Full floating type, spiral bevel gears.

FRONT AXLE—Special ReVere design, drop forged.

Knuckles—Extra heavy drop forged chrome nickel steel knuckles and steering connections, all tested to 100,000 pounds, elastic limit, all steering joints ball adjustable type, short turning radius.

FRAME—Special ReVere design front and rear kickup.

SPRINGS—Silico manganese special alloy steel, heat treated.

Front Springs—Semi-elliptic.

Rear Springs—Special ReVere design, very long, 58 inches long, 2½ inches wide with rebounding springs.

STEERING GEAR—Worm and gear type, all gears and shafts hardened and ground and adjustable for wear, in all directions. Special ReVere design spark and gas control.

CARBURETOR—Miller or Stromberg.

RADIATOR—Exclusive ReVere design, honeycomb type, mounted in aluminum shell.

WHEELS—32x4½ wood or wire wheels. Tires 32x4½ Goodyear Cord.

WHEELBASE—130 inches

BODY—Speedsters, six-passenger Touring Car and four-passenger Sport Type.

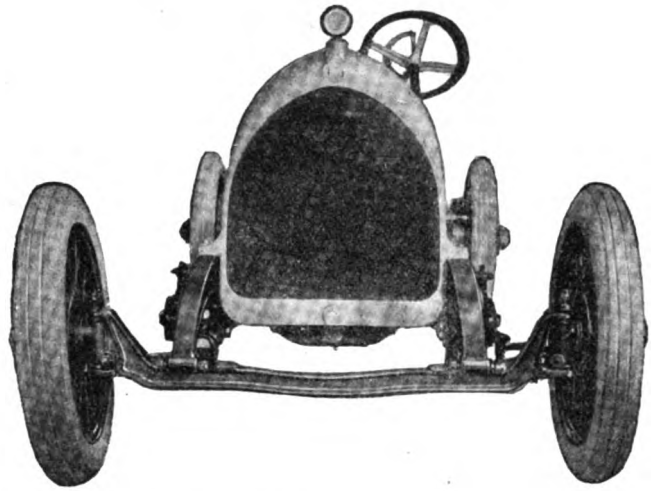
Fully Equipped $3750—$3850 f. o. b. Logansport, Ind.

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The ReVere Motor Car

Duesenberg Racing Type Motors. Used in all ReVere Cars.

Speed from 4 to 85 miles an hour—130-inch wheelbase.



The ReVere

The product of organized co-operation, of acknowledged leaders, of advanced thought in this particular field of activity.

We offer a select number of big calibre dealers in the larger population centers, a connection and service unparalleled in this day of specialization.

Every essential of greater business building capacity has been included in our plan.

Due to limited output for 1918, we urgently advise getting in touch with us at once.

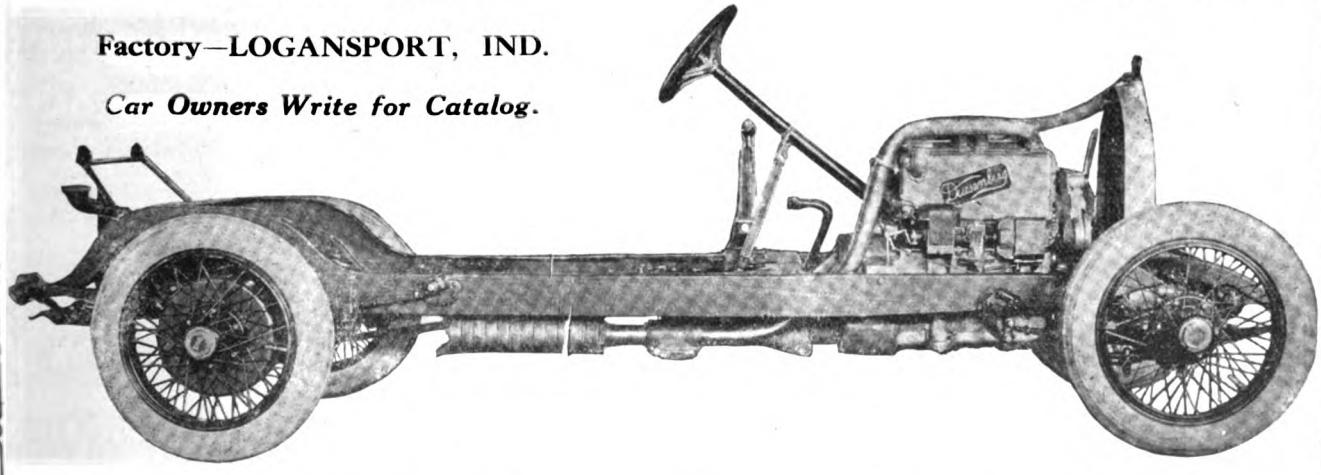
WIRE OR WRITE FOR FULL INFORMATION.

ReVere Motor Corporation

305 MALLERS BLDG. CHICAGO

Factory—LOGANSPORT, IND.

Car Owners Write for Catalog.

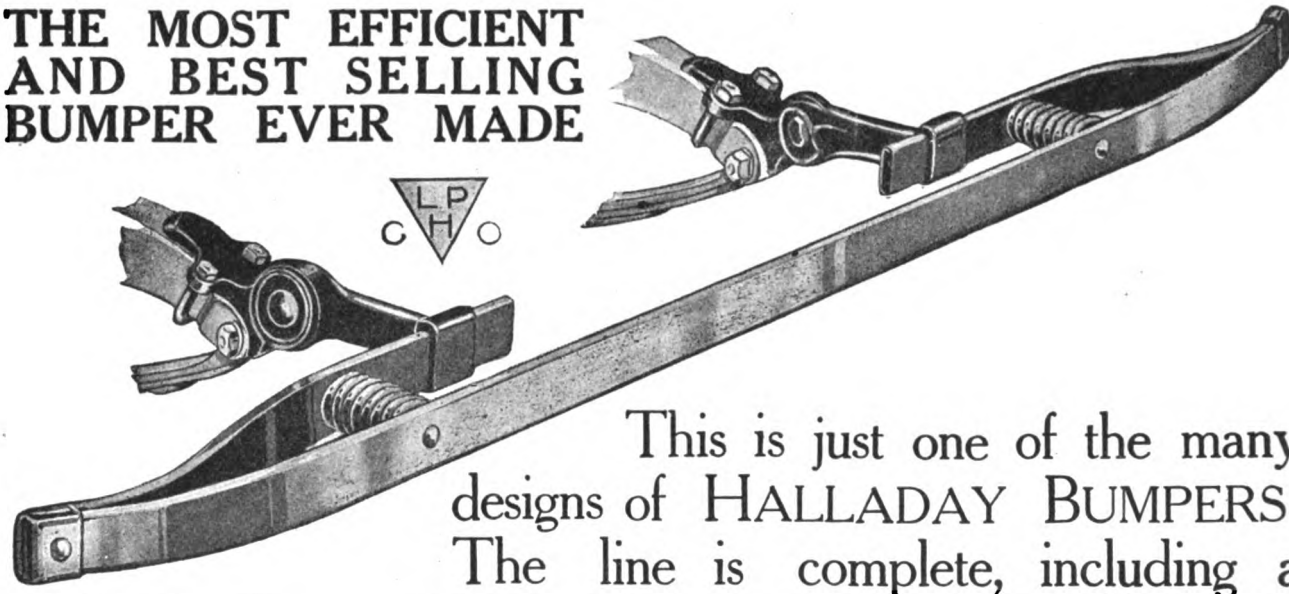


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HALLADAY BUMPERS

MULTIPLE SPRING BAR

THE MOST EFFICIENT AND BEST SELLING BUMPER EVER MADE



This is just one of the many designs of HALLADAY BUMPERS. The line is complete, including a bumper for front and rear of every car.

The HALLADAY LINE OF ACCESSORIES includes
SHOCK ABSORBERS, TIRE CARRIERS,
TILTING STEERING WHEELS,
HALLADAY CAN TIPPERS
AND OTHER PRACTICAL NECESSITIES.

THE DEALER WHO CARRIES THE HALLADAY LINE IS RIGHT IN PRICE, QUALITY AND PROFIT.

SOLD THROUGH REGULAR CHANNELS

Write for complete catalog.

L. P. HALLADAY Company.

STREATOR - - - - - - ILLINOIS

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Strangling the Periodicals

CONGRESS at its last session passed a hasty postal law increasing the postage on periodicals from FIFTY TO NINE HUNDRED PER CENT THROUGH A POSTAL "ZONE" LAW. *The postal "zone" system was abolished by Abraham Lincoln in 1863 on the recommendation of Postmaster General Blair and has since also been condemned by U. S. Postal Commissions.*

Under the postal zone law some periodicals will be killed—all will be crippled. There will be fewer readers, and the habit of reading curtailed. The great functions of periodicals is to assist in the spread of ideas—by printing the achievments in the world of thought, culture, and science.

Thus to shut out farm journals—as these zone rates will—will lessen the productive power of our country by millions of dollars through loss of better methods. Shut off trade journals and you decrease the manufacturing power by more millions. Shut off the religious papers and there are shut off channels that have raised millions of dollars for distressed humanity. Shut off the great periodicals of the home and there is throttled an avenue that has given expert instruction to hundreds of thousands of mothers and saved their babies to health and citizenship.

These national periodicals are printed in the big cities—and the first zone, the cheapest zone, is in or near those cities; there are many educational opportunities near cities, and the cities will read anyway. Small towns and distant districts depend to a large extent upon periodicals; thus this law (increasing periodical postage where it is most needed) shuts off opportunity where needed. It penalizes periodical readers.

Congressman Claude Kitchen of North Carolina, who fathered it and compelled its adoption, refusing hearings on the measure,—it had been twice defeated by the Senate—stated in his speech in Congress that it was **not** a War Revenue amendment **but permanent postal legislation.**

Canadian magazine readers, even to the Arctic Circle, can receive American magazines at four cents a pound postage. Every American reader—if they live west of Missouri—**must pay almost twice as much postage, or from 4½ to 8 cents postage per pound for the same magazines!** This is what the postal "zone" law means—discrimination against American citizens of **all** Western States. Do you live West of Missouri—of Minnesota, Iowa, Arkansas or Louisiana? Then this postal "zone" law discriminates against you in favor of every Canadian reader to the shores of the Pacific and North to the Arctic Circle!

Will you help?—Sign NOW.

It is not a War Tax. It is postal legislation, pure and simple.

Repeal this law. Repeal this FIFTY TO NINE HUNDRED PER CENT periodical postage increase with its unfair, iniquitous and disastrous "zone" system. Sign the petition below and mail it. Put a cross mark in the square—save the periodicals and the work which they have done and are doing for national education and patriotism.

PETITION TO CONGRESS—Sign Here!

The spread of education, of culture, of scientific knowledge and advancement, and of our vast internal merchandising and manufacturing has been, and always is, vitally dependent upon the freest and cheapest circulation of periodicals. The penalties resulting from any restriction on the freest possible circulation of periodicals will be destructive of the best interests of our economic life and the opportunities of developing our best citizenship.

The postal amendment passed by the last Congress increasing the postage on periodicals from FIFTY TO NINE HUNDRED PER CENT with its postal "zone" system will throttle or destroy our periodicals at a time when the widest and most extensive circulation of publications is essential to the patriotism, education, and upbuilding of our country.

Therefore, I, the undersigned, do most earnestly demand the repeal of this burdensome periodical postage amendment.

Name .....

City or County .....

Street Address .....

State .....

Periodicals mean much in your life. If you will help by a few arguments with your acquaintances and an occasional letter to your Congressman in a spare moment, put a cross mark here.

☞ *Will you help in securing the repeal of this iniquitous law?* ☐

CUT OUT. MAIL TO

CHARLES JOHNSON POST

Room 1417, 200 FIFTH AVENUE, NEW YORK CITY

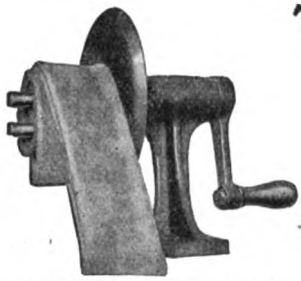
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Do More Tire Repairing—At Less Expense

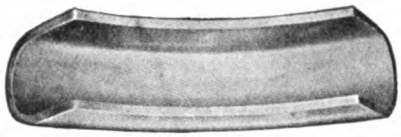
Akron-Williams

TIRE REPAIR EQUIPMENT

Used by All Leading Tire Companies



With this Tube Deflator you can get the air out of an inner tube in a jiffy. It is large enough to deflate any size tube, and small enough to put anywhere without taking up valuable shop space. **Price $4.50 F. O. B. Akron; 5% off for cash with order.**



Akron-Williams Solid Reducing Shells will fit into larger mold cavities, and enable the repairman to utilize **large** size molds for vulcanizing repairs on **small** casings whenever desired. Increase your capacity on small casings at nominal expense. ***Write for price list.***



Tire Re-Building Stand similar to those used in tire factories, but with improvements for repair-shop use.

Meet the increasing shortage of labor and the rising cost of doing business by using new Akron-Williams devices to turn out more and better work in less time. Fully described in new Catalog, brimful of everything for the tire repairman—send for it.

There is an Akron-Williams outfit for every size shop, and a machine or tool for every purpose in tire and tube repairing. No equipment is too large for us—no tools are too small.

And each and every piece is designed and perfected with the aid and co-operation of engineers employed by the large tire companies.

Prompt Shipments

With the completion of our large new factory, devoted wholly to building repair equipment, we are in position to make prompt shipment on all orders.

YOUR INQUIRIES ARE SOLICITED

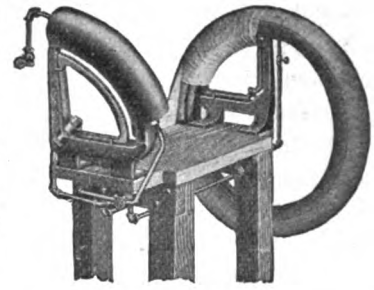
The Williams Foundry & Machine Co.

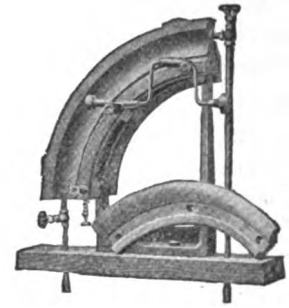
Largest Builders of Tire Repair Equipment

Glendale Street - - - Akron, Ohio

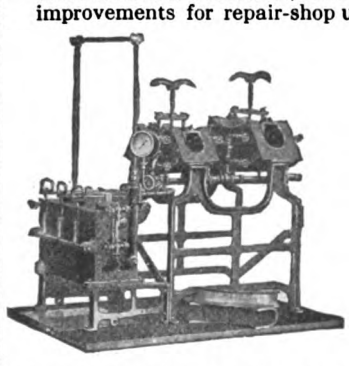
Exclusive Distributors for California: The Waterhouse & Lester Co., San Francisco, Oakland, and Los Angeles

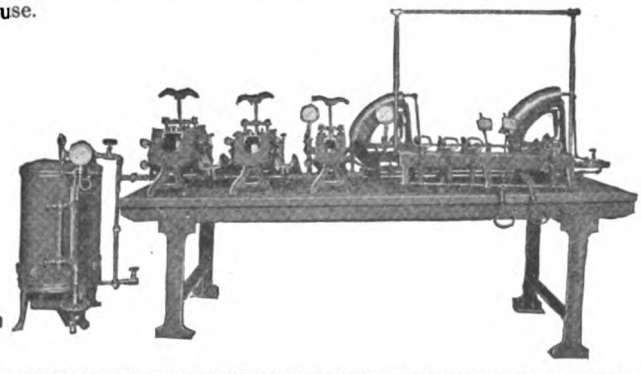


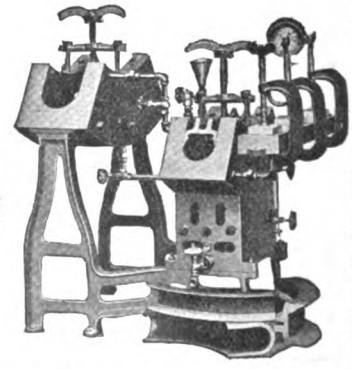




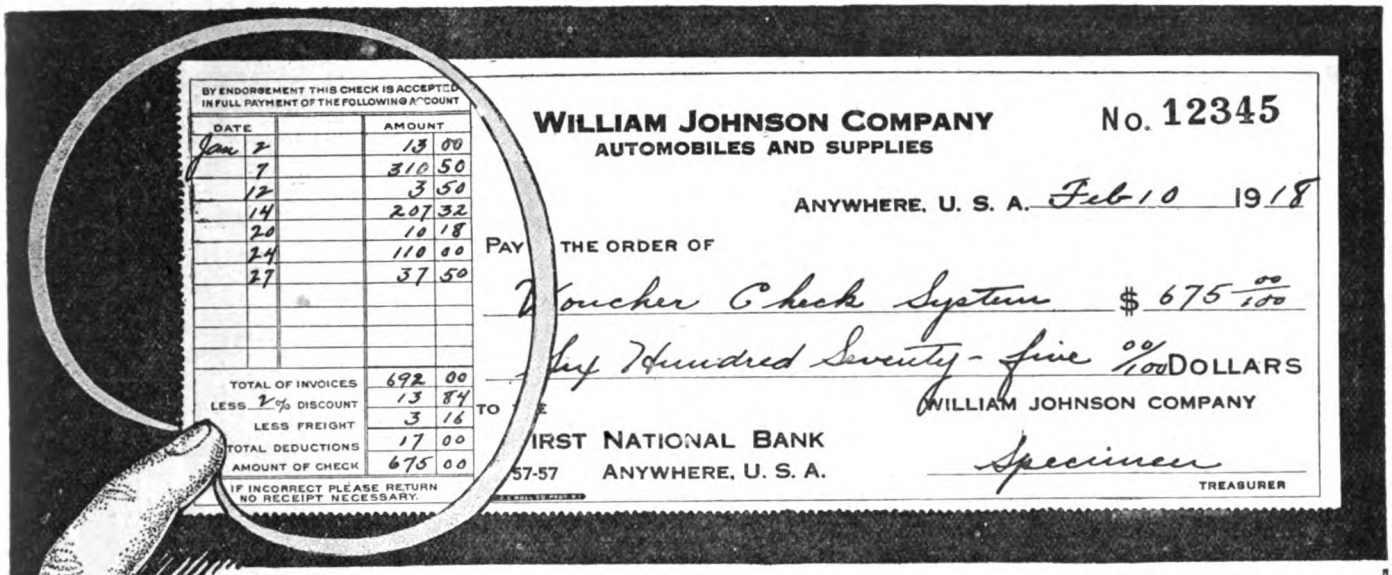








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DON'T PAY BILLS TWICE!

Eliminate Disputes and Time-Wasting File Hunting

Have you ever met one of those old-time merchants or manufacturers—the kind who carry their books in their head and their bank in their pocket? Some of them made money in spite of their system but most of them lost a lot that they never knew they lost. They would have "gone broke" if they had not been frugal, for they ran business on the principle of "don't worry about what you don't know."

Yet the average man of to-day is almost as careless in some of his methods of doing business. In the matter of paying bills, for instance, how many men are there who have not had a dispute over a bill they've paid—and yet have had all sorts of trouble to get at the evidence to prove it. Here's a typical case:

Johnson had a number of irons in the fire. He conducted a garage, dabbled a little in contracting, and held a town office. One morning a letter was laid on his desk—with a bill for $110 for some coal he had bought through a local dealer from whom he also bought grain and lumber.

"I think we've paid that bill," said Johnson's bookkeeper.

"Paid it! Of course, we've paid it. I remember it myself. Get out the receipts and bring me the check-book."

And then the bookkeeper reported:

"I'm positive that we paid that bill for coal, but I can't find any receipt for it. It may have been mis-filed or mislaid."

With a growl about carelessness Johnson went through his check-book, but couldn't find any stub for $110. But finally he found the stub of a check drawn to the Coal Company for $675, and the bookkeeper found the $675 paid check endorsed by the Coal Company.

"Well, perhaps it was included in that check, along with some grain or lumber," said Johnson. "The Coal Company certainly got $675 of our money, but the check doesn't tell us what for."

More vexatious hunting and loss of temper. Eventually the $675 invoice came to light disclosing the fact that the $110 coal bill had been paid.

Johnson called up the coal people and vented some of his bad temper on them. They were very sorry. "It was an error of one of our clerks. It won't happen again, we feel sure. These things occur, you know, in even the best business houses," they said.

• • •

Are these things occurring in *your* business? Many a bill *has* been paid a second time through lack of a system.

Do away with such possibilities. Do away with losses of time, losses of temper and vexatious file hunting for lost or mislaid receipts. Use Hall Voucher Checks. They earn big dividends on a small investment. They enable you to pay your bills in a systematic, mistake-eliminating manner. If Johnson had used the above check there would have been no loss of time. To-day he pays all bills with the Hall Voucher Check.

Look at the check—study the statement form. Note the items under the heading, "By Endorsement this Check Is Accepted in Full Payment of the Following Account." The amount of each one of the number of items, included in the total for which the check is drawn is tabulated on a line by itself. Against each itemized amount you can set down what it is for—coal, grain, lumber, etc.

Below is the total of the invoices and beneath it the discounts and freight deductions and their total, which, subtracted from the total of the invoices, shows how the amount of the check is obtained.

A perfect record and a simple one. See how it protects you on your personal, or business bills—doing away with all follow-up on bills, checking of bills and filing of receipted bills against the day of a disputed payment—the simplest bill-paying-receipting-and-filing system it is possible to get.

• • •

The Hall Voucher Check was devised by a concern that has been the leading manufacturer of bark checks for forty years. It was designed to do away with money losses, time losses and with a lot of useless bookkeeping and filing that in the end does not prevent losses.

The Hall Voucher Check is an always-at-hand indisputable receipt—an itemized, positive evidence of payment.

These checks are made in standard form—3¼ inches by 8⅓ inches; stub 5½ inches long; six colors of selected bond paper—White, Buff, Blue, Green, Gray and Russett; or three colors of National Safety Paper—Pink, Blue and Primrose. Books of 500 checks, perforated and numbered in red ink, 3 to page, imitation leather backs, flat stitched. Sample book to business firms upon request. We have other forms than the one shown here.

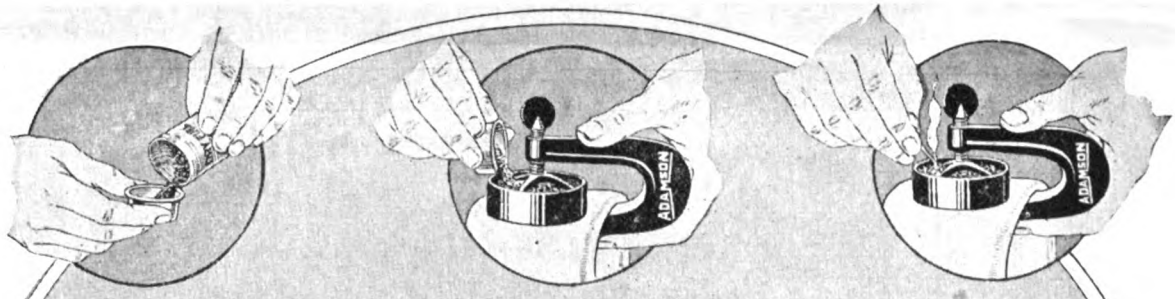
In order to introduce these checks more thoroughly, the manufacturers are now making the following special introductory prices, with delivery charges paid if remittance accompanies the order:

		Bond	Safety
500	Checks	$ 4.50	$ 5.00
1000	"	7.00	8.00
2000	"	13.00	15.00
3000	"	18.00	21.00
5000	"	25.00	30.00

These prices are for printing in black ink. For bank name in red ink add 50 cents for each book of 500 checks.

Test the time and money-saving efficiency of these checks. Do away with losses and uncertainty about payments. Note again the small cost of the checks and mail your order to-day, writing very legibly the name and address of the concern or the individual name to appear on the check, and the correct bank title, the printing to appear over and under signature line and first number to be used. Remit P. O. Money Order or Draft on New York or Boston, if you have no commercial rating. We know that these checks will prove valuable to you.—THE J. C. HALL COMPANY, 71 West Exchange St., Providence, R. I. Bank Stationers for 40 years. Ask any bank about us. No Agents Wanted.

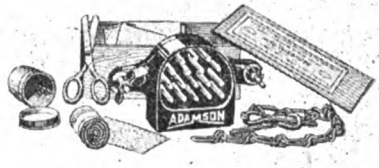
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Using Dry Fuel to Repair Tube Puncture with the New ADAMSON 5-Minute VULCANIZER



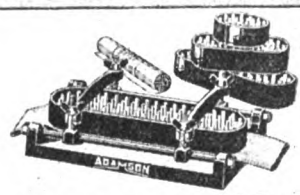
MODEL "E" $1.00



MODEL "U" $2.00



MODEL "T" $1.50



MODEL "S" $12.00

ADAMSON VULCANIZERS

"The Line of Least Resistance"

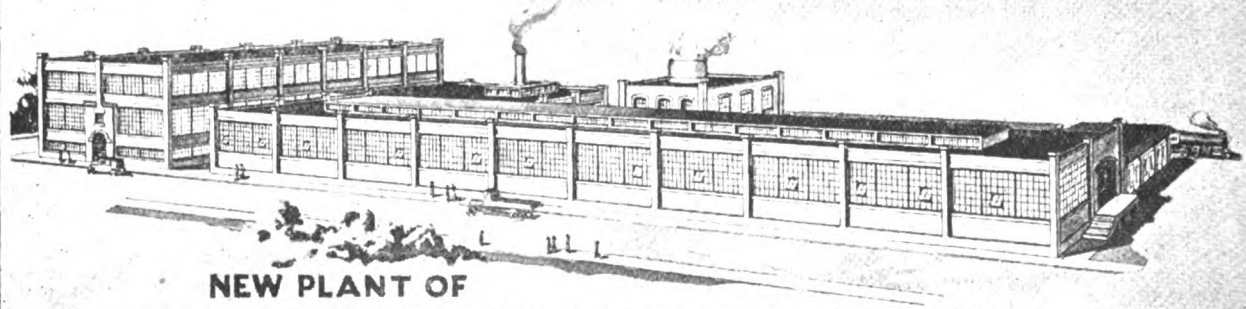
Adamsons are easy to sell because practically every motorist knows and prefers them for their extremely simple and durable design,—for the ease with which they make lasting repairs,—and for the fact that every model uses Common Gasoline, the handy fuel that is always dependable. The Dry Fuel feature of Model E is an extra selling point.

Meet the demand for Economy in tire expense with the complete Adamson line — a model for every tube and casing repair that a tourist can make, and Adamson Repair Gum for best results with any make or model of portable vulcanizer.

To Show Adamsons is to Sell Them.
Put them up in front.
Write for Store Displays and Dealer Helps.

Adamson Manufacturing Co.
EAST PALESTINE, OHIO

We also make Adamson Ford Brake Shoes, lined and unlined



NEW PLANT OF
ADAMSON MANUFACTURING CO.
EAST PALESTINE, OHIO.

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"I THANK YOU—



FOR TELLING ME ABOUT THE

A & H

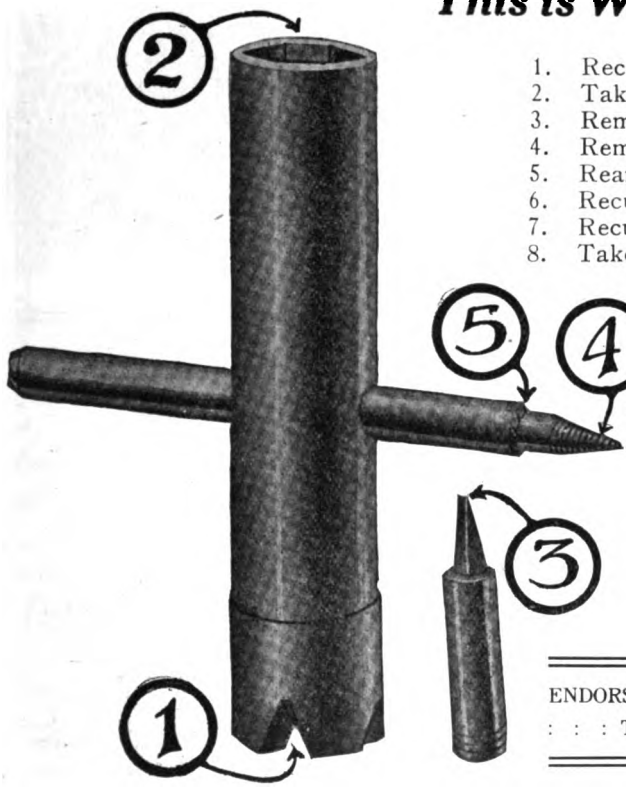
VALVE REPAIR TOOLS"

You Can't Get Along Without Them—You've Been Looking for Them

HERE THEY ARE

This is What You Can Do With Them:

1. Recut outside stem threads.
2. Take off hexagon nuts.
3. Remove broken plungers.
4. Remove broken plungers.
5. Ream off rough nipples.
6. Recut inside plunger threads.
7. Recut outside nipple threads.
8. Take out plungers.



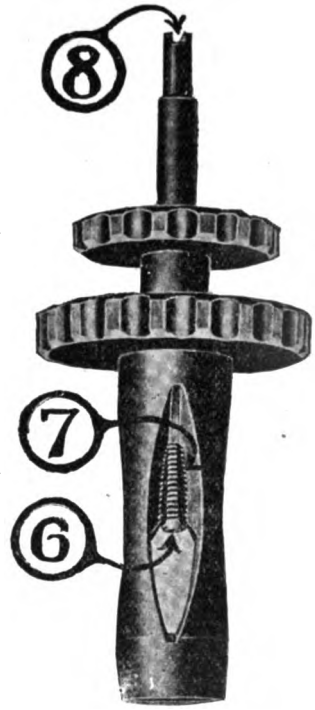
VALVE REPAIR TOOL
(Actual Size)

A Wonderful Combination

Two Tools
FOR
$2.00
To the Trade
$1.13 each if bought separately
List $1.50 Each

ENDORSED BY ALL THE LEADING
: : : TIRE MANUFACTURERS : : :

Ask Your Jobber



TRUE THREADER TOOL
(Actual Size)

A. & H. MANUFACTURING CO., Inc.

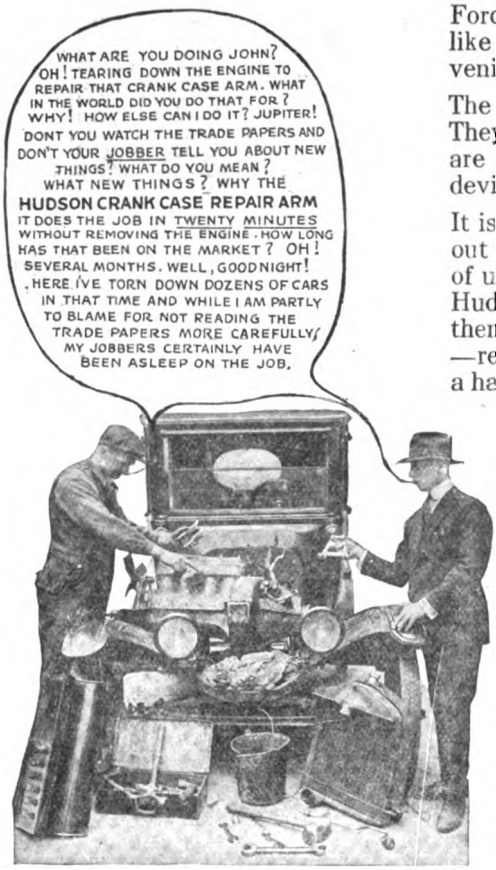
505-507 WEST 45th STREET - - - NEW YORK CITY

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HUDSON

CRANK CASE REPAIR ARM

$1.50 F. O. B. Philadelphia



HUDSON Crank Case Repair Arms are as necessary to garagemen, repairmen and Ford owners as watches are to railroad men. To repair broken Ford crank cases the slow old way is like telling time by the sun—It's inconvenient and more complicated.

The photographs tell the Hudson story. They tell how time, money and labor are saved by the use of this repair device.

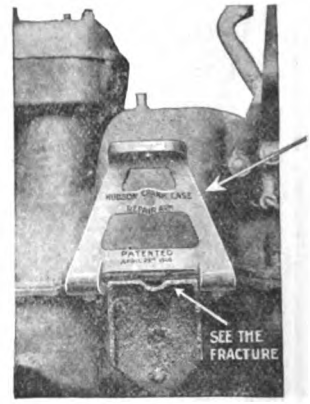
It is not necessary to take the engine out of the chassis—it's just a matter of unloosening three bolts, slipping the Hudson Arm into place and tightening them up again to make a perfect repair—requiring less than a half hour to do a half day's job.

Every repairman should have Hudson Repair Arms for making crank case repairs and a stock to sell Ford owners. Get them from your jobber—if his name is not listed, write us direct.

Jobbers: Here's a rapid and a profitable seller. It is one that you can sell to practically all your customers. Write us at once for discounts.

It is patented—
beware of infringers

$1.50 F. O. B. Philadelphia



A Wrench and 15 Minutes Does the Work



JOBBERS IN UNITED STATES and CANADA

PENNA.—Philadelphia
Hudford Phila. Sales Co., Inc.
Auto Specialties Co., 156 N. Broad St.
Miller & Ecret Company
J. H. McCullough & Son
Berrodin Rubber Co.
Geo. W. Nock Co., 1304 Race St.
Cahall Motor Supply Co.
Roberts Electric Supply Co.
Gaul, Derr & Shearer Co.
Standard Sup. & Equip. Co.
Manufacturers Supplies Co.
Grim's Auto Supply Co.

Allentown
Great Eastern Rubber Co.
Motor Accessories Company
Hersh Hardware Company

Johnstown
Swank Hardware Co.

Lancaster
General Auto Supply Co.

Pittsburgh
Dyke Motor Supply Co.
Joseph Woodwell Co.
Auto Accessories Co.

Scranton
Chas. B. Scott Co., 119 Franklin Ave.
Lansing Hdwe. Co., 130 Washington Ave.

SOUTH CAROLINA
Florence
D. W. Alderman Co.

Charleston
Cameron & Barkley Co.

OHIO - Cleveland
Cray Bros.
M & M Company
Pennsylvania Rubber Co.

RHODE ISLAND
Providence
Post & Lester Company
Waite Auto Supply Co.

MARYLAND
Baltimore
Baltmo. Hub Wheel & Mfg. Co.
Piet Robertson Rainey Co.

MASS.—Boston
Post & Lester Company
John V. Wilson Co.
Motor Car Equipment Co.
Wetmore Savage Company

DELAWARE
Wilmington
Automobile Supply Co.
Delaware Hardware Co.
Wilson Hardware Co.

CAL.—San Francisco
W. E. & W. H. Jackson

NEW YORK—N. Y. City
Hudford Sales Corporation
Strong & Trowbridge Co.
W. E. Pruden Hardware Co.
Westchester Accessories Co.
Lowe Motor Supplies Co.
Motor Car Equipment Co.
A. J. Picard & Co.
Whitmore-Sim Co.
Westchester Accessory Co.
Richards Auto Supply Co.

Brooklyn
Martin Evans Company

Buffalo
F. A. M. Auto Supply Co., 694 Main St.
United States Rubber Co., 39 Washington Street

IOWA—Council Bluffs
Rothert Motor & Supply Co.

Des Moines
Herring Motor Company

MISSOURI—St. Joseph
Ayers Farmer Auto Sup. Co.

St. Louis
Slego Iron Store
Neustadt Auto & Supply Co.
Western Auto Supply Co. 1918 Barnam St.

Kansas City
Bonniwell Calvin Iron Co.

ILLINOIS—Chicago
Hudford Co. of Chicago, Inc.
Hine-Watt Mfg. Co. 180 N. Market St.
United States Rubber Co., 218 West Madison St.
Electric Appliance Co., 701 Jackson Blvd.
New England Mills Co., 1219 Michigan Ave.
Beckley Ralston Co., Michigan Ave. & 18th St.
Gray Heath Company, 1440 Michigan Ave.

MICHIGAN—Detroit
E. A. Bowman Company
Automobile Equipment Co.
Automobile Supply Co.

TEXAS—Fort Worth
Texas Auto Supply Co.

Austin
Walter Tips Co.

Houston
Peden Iron & Steel Co.

NEW JERSEY - Newark
Motor Car Equipment Co.
Thompson Reilly Co.
Elin Auto Supply Co.
Economy Auto Supply Co.
H-H-H Motor Supply Co.

CONN. - Hartford
Post & Lester Company
WASH. - Seattle
Washington Auto Supply Co. 917 East Pine St.
OKLAHOMA
Oklahoma City
Rex Auto Supply Co., 116 W. 2nd St.
Severin Tire & Supply Co.
CANADA
Montreal, Quebec
Canadian Fairbanks-Morse Co., Ltd.
Windsor Ontario
Universal Car Agency
Hamilton, Ontario
Wood, Alexander & James
Calgary, Alta.,
Wood, Vallance & Adams
EXPORTERS—
Pedro y Seltzer, Inc., New York City
Kemsley Millbourn Company, New York City—Australia
Dodge & Seymour Company, New York City—Australia and S. Africa
Pacific Commercial Company, New York City—Philippine Islands

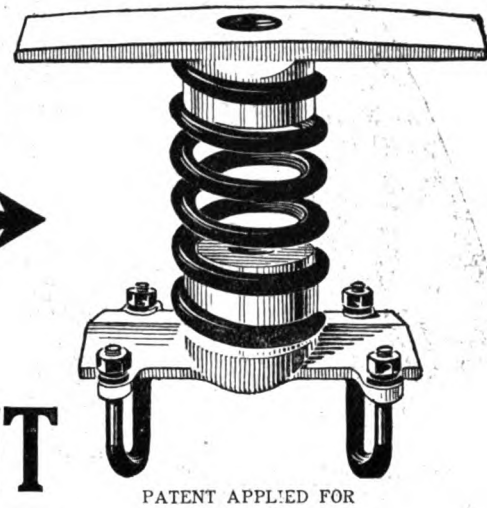
HUDSON MOTOR SPECIALTIES COMPANY

1606 Real Estate Trust Building :: :: PHILADELPHIA, PA.

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Mr. Ford-owner! Attention!

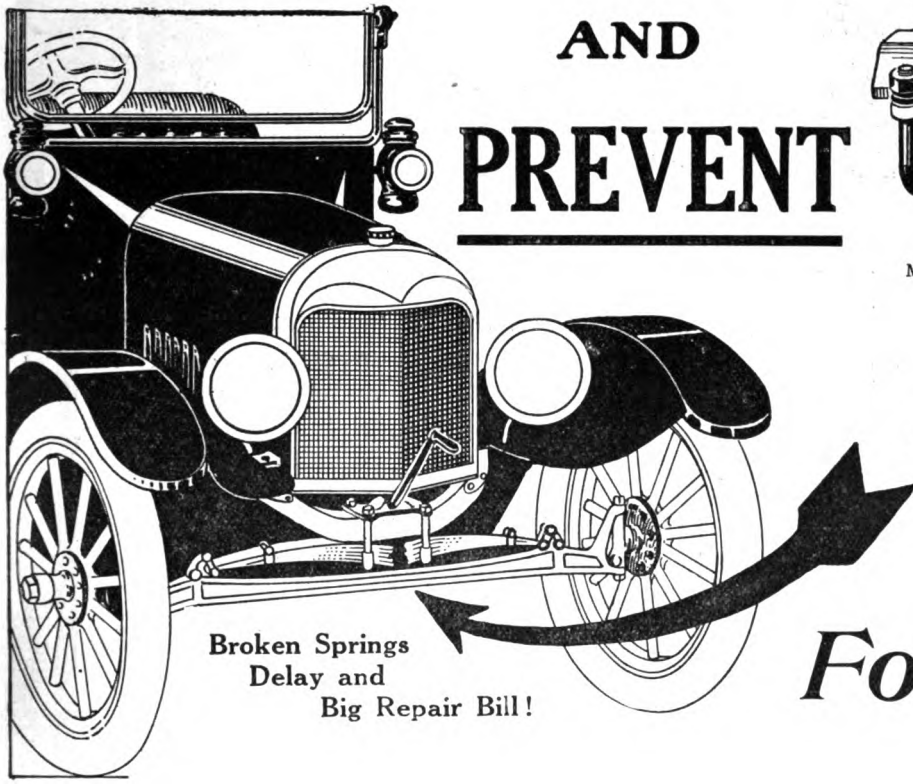
USE THIS



PATENT APPLIED FOR
Model A for Ford Cars
Made in Brooklyn, N. Y., U. S. A.

AND

PREVENT



Broken Springs
Delay and
Big Repair Bill!

THIS

For $6.50

PLUNKETT SHOCK ABSORBERS

"A Shock Absorber and Rebound Snubber in One"

It doesn't pay to run the risk of being without one—no man knows just when he's going to meet that bad spot in the road—or just when his Ford is going to have extra weight to carry.

The Plunkett Shock Absorber will preserve the springs of the automobile indefinitely regardless of extra weight or rough usage. It not only absorbs the shock before it reaches the springs, but serves as a support for the central portion of the springs where the main strain is applied. In addition to these features it does not detract from the appearance of the automobile.

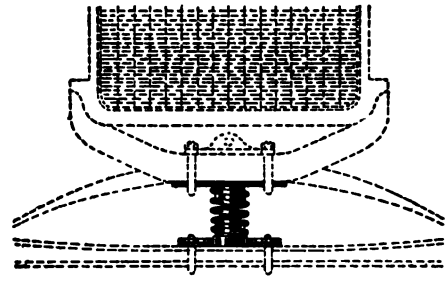
Price, $6.50 each complete

On receipt of check or money order, will ship prepaid to any part of the United States.

For Sale by All Progressive Dealers, Jobbers, Supply Stores and Garages

Write Us for Full Particulars

Agency Open—Send for Dealer's Proposition



PLUNKETT SHOCK ABSORBER CO.

323-5-7 WASHINGTON STREET : BROOKLYN, N. Y.

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Listen to the motor *sing*

The song of the motor will tell you in a moment that Hi-Comp Piston Rings are perfectly *gas-tight*. That *different* tune they make the motor sing proves the motor has been given NEW life, NEW power, NEW efficiency.

HI-COMP PISTON RING
THE RING THAT MAKES THE MOTOR SING

deliver every ounce of power from every drop of gasoline *on* the piston head—where it belongs. None of that power can get *past* the rings, because the Hi-Comp scientific principle and perfect mechanical construction make each ring remain a *gas-tight seal* under all conditions—racing or creeping along or *gliding* up hills. This *gas-tightness* overcomes carbon troubles which are due to oil getting past the rings into the explosion chamber where it *burns*. Hi-Comps end knocking, skipping and faulty ignition; pitting of valves and valve seats; and are *guaranteed* to give *MORE POWER* on much less gasoline and oil.

Made by an old established piston ring company from 2 perfectly balanced eccentric rings into one perfect concentric ring that will not wear cylinder out of round – *proof* of gas-tightness. Each ring ground and polished *under oil* to preserve true temper of secret process grey iron and finally tested by micrometer examination. Make reboring of average cylinders unnecessary—proof of perfect expansion.

Write for booklet, specification chart and details of liberal 90-day guarantee trial. It will pay you to install Hi-Comps because they give *satisfaction*.

CONTINENTAL PISTON RING CO.
MEMPHIS . . . . . TENN.

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I AM PLEASING THOUSANDS AND I CAN PLEASE YOU!



OUR **Double-Service Tire** is **Two Standard Make** tires bound together so that each strengthens the other—so that the two will give **More than Double** the service that either one alone could give. This joining together of **Two A-No. 1 Tires** by our process makes a tire that has **Double the Strength, Double the Fabric** and **Rubber,** and **Double the Thickness and Protection** for the inner tube, against the accidents and mishaps of the road, makes it **Absolutely Puncture-Proof and Cut-Proof.**

Our **Double Service** Tires are giving upwards of 6,500 miles of wear and service to Automobile Owners all over the United States, and they will give YOU that too, and with added security from punctures and cuts of all kinds.

Make sure when ordering tires to state whether Q. D., Straight bead or Clincher type.

We carry a full line of New First and New Second Tires at a big saving. Write for prices, mentioning sizes. Prices upon request.

Terms: 10% Deposit, Balance C. O. D.

I. JAFFESS, Two Stores: 1319A Fifth Ave., 241 West 54th Street, **N. Y. CITY**

FORD DEMOUNTABLE WHEELS and CARRIER

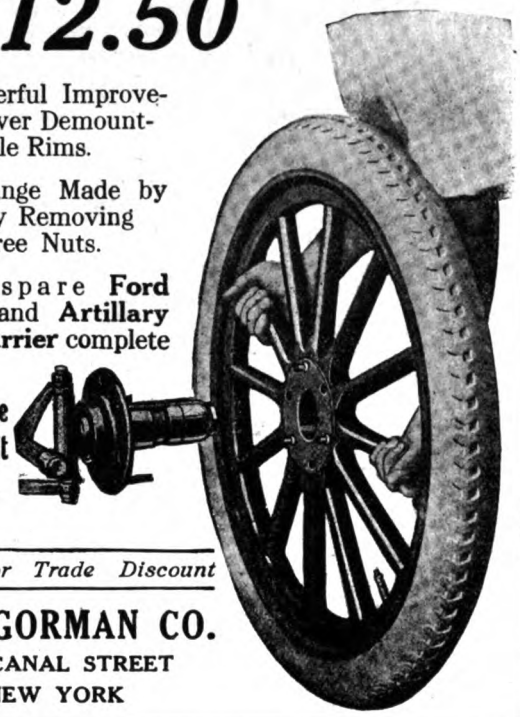
$12.50

A Wonderful Improvement Over Demountable Rims.

Tire Change Made by Simply Removing Three Nuts.

Extra spare **Ford Wheel** and **Artillary Type Carrier** complete with

Demountable Wheel Outfit For Fords.



Write for Trade Discount

J. P. GORMAN CO.
382 CANAL STREET
NEW YORK

F-F BATTERY BOOSTER

MAGNETIC RECTIFIER

Patented April, 1916



Full Wave A. C. Rectifier

CHARGE YOUR OWN BATTERIES

For Public or Private Use

This little machine is selling like hot cakes and makes every purchaser smile at his own business sagacity, and wonder why he hadn't bought one before.

You simply attach it to the lamp socket and at a few cents cost for current, your battery is full of "pep."

Buy Now.

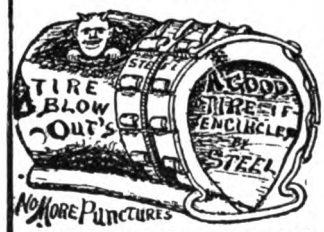
$24 Complete, and up
F. O. B. Cleveland

The France Mfg. Co.
Cleveland, Ohio

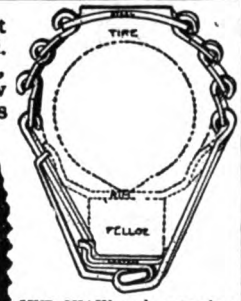
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MUD CHAIN can be put on in a jiffy with one hand while standing on the run board. If you get in a mud hole you will laugh out loud. Hook the ends together and pull the little lever and they are on tight. Good for blowouts.

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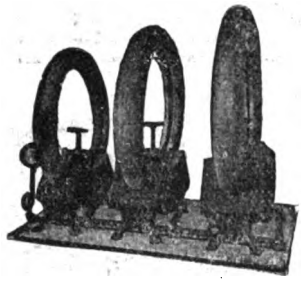
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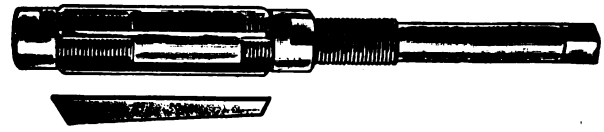
STOCK SIZES				
PIECE No.	Outside Diameter	Inside Diameter	Length	Approximate Weight
A	1	½	12	2
H	1¼	½	12	3½
C	1½	¾	12	5
D	1¾	¾	12	7
E	2	1	12	8½
F	2¼	1¼	12	10
G	2½	1½	12	11½
H	2¾	1¾	12	12¾
I	3	2	12	13¾
J	3¼	2¼	12	15½
K	3½	2½	12	17
L	4	3	12	21
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The best made for repair work

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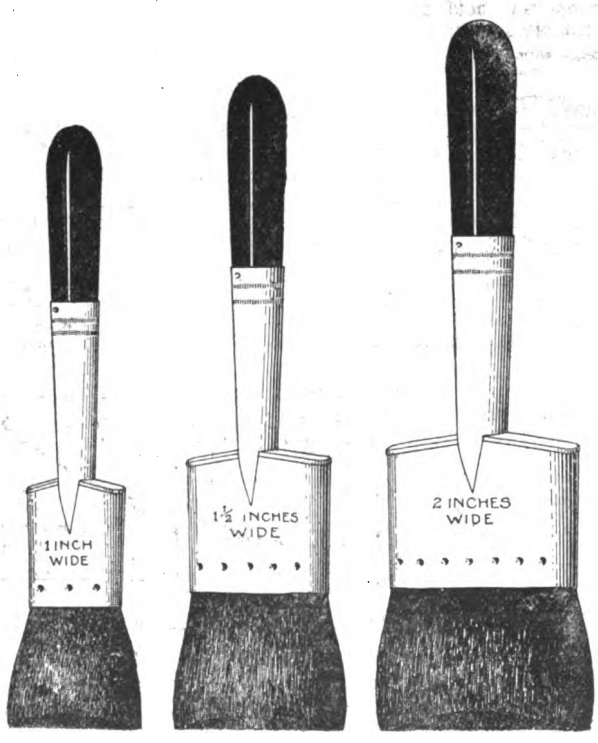
Reams odd size holes

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A Set of Three Brushes and the Automobile Dealer and Repairer for One Year for $2.00



Brushes Needed in Repainting and Varnishing an Automobile.

Did it ever occur to you that there was much difference between a good paint or varnish brush and a poor one? Probably not. To most people a brush is just a brush. Yet an analysis shows that there is an almost measureless difference between a good brush and poor one.

For instance, a properly made Flowing Fitch brush is hermetically sealed, so as to keep the paint, or whatever may be used, from getting into the brush at the top and loosening the hairs. All such properly made brushes are solidly set in glue cement inside a leak-proof ferrule, and a whole row of neatly clinched nails are driven in at the end of the ferrule to give added security, and a guarantee that the hairs will not pull out.

A Fitch brush is *smooth, soft,* and *flowing,* and does not "mush" up or get flabby like a cheap brush, but holds its springiness. The trouble with cheap brushes is that the ferrule is nothing more than a single band of tin, open at the top, with a couple of nails jabbed through. When you use such a brush the cheap hair will pull out and scatter all over your work, because it is not held in securely enough to stand the drag of the brush in painting or varnishing.

A brush may be washed with gasoline or kerosene oil, but to clean it thoroughly turpentine should be used. No brush used for painting should be used for varnishing.

We have recently made arrangements with one of the best manufacturers of these properly made brushes in New York to offer a set of Three in connection with a subscription to the AUTOMOBILE DEALER AND REPAIRER for a year for **an even $2.00.** These brushes sell at retail for **$1.40.** It will be seen, therefore, that there is a substantial advantage in sending to us for the AUTOMOBILE DEALER AND REPAIRER for a year, and for a set of these brushes.

Present subscribers can have their subscriptions extended for a year, and secure a set of brushes, on the same terms. These brushes are guaranteed in every respect, and though they cost more than cheap brushes would cost, they are far cheaper in the end, because of their lasting qualities and the good work that can be done with them. No man can afford to waste expensive paint and varnish on an automobile by using a cheap and poorly constructed brush, such as is usually to be found wherever brushes are sold. The ordinary dealer in brushes himself as a rule has very little knowledge of the quality of the brushes he sells.

Remit by check or money-order, and your name will be entered as a subscriber to the AUTOMOBILE DEALER AND REPAIRER for a year, and a set of these brushes, which are just the right size and shape (see illustration, which is exactly one-half the actual size of the brushes,) will be sent to you, postage prepaid.

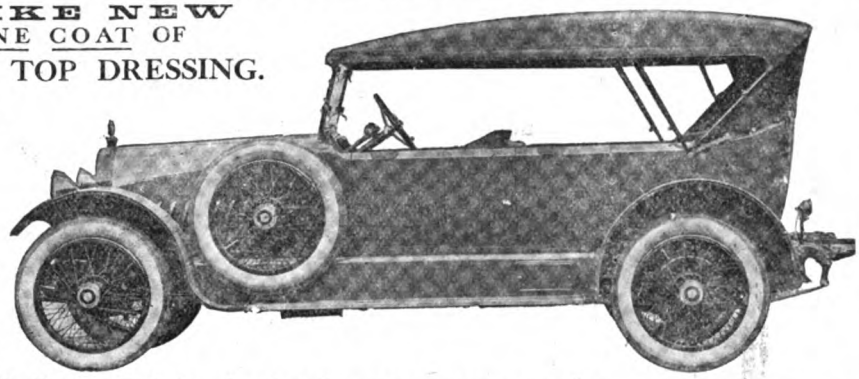
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THAT RUSTY MOHAIR TOP

WILL LOOK LIKE NEW
IF YOU TREAT IT TO ONE COAT OF
FRANK MILLER'S MOHAIR TOP DRESSING.



Facts About Mohair Tops
Which Every Motorist Should Know

MOHAIR CLOTH depends for its waterproof qualities *only* upon a thin sheet of rubber composition inserted between the two layers of cloth.

ONCE THIS RUBBER INSERT BECOMES POROUS, THE TOP IS GONE.

MORE MOHAIR TOPS ARE RUINED by the use of injurious dressings than ever wear out naturally

THIS IS BECAUSE nearly all the top dressings on the market contain some substance such as Alcohol, Turpentine, Benzine, Gasoline or oils which will attack rubber.

THESE SUBSTANCES slowly eat into the rubber insert and destroy its elasticity.

WHEN THE TOP IS LOWERED, the rubber insert cracks along the folds, making small holes through which the water enters.

IT MAY TAKE A MONTH or more to spoil a top in this way, for the action of these substances is sometimes slow and the damage is not visible, but

WHY SPOIL THE TOP AT ALL
WHEN YOU CAN GET A DRESSING WHICH WILL *NOT* HARM IT
FRANK MILLER'S MOHAIR TOP DRESSING



Is specially prepared to be absolutely non-corrosive. It is different from all others. It contains no harmful ingredients.
It will impart a wonderful silky sheen with ONE COAT—AND THE FINISH LASTS.
It is carefully made by a manufacturer whose reputation for Quality Products has been of the highest for more than EIGHTY YEARS.

THIS IS A DRESSING—IT IS NOT INTENDED TO MAKE A LEAKY TOP WATERPROOF. Attempts to fill up the holes in a porous rubber insert with some kind of waterproofing compound seldom gives the expected results Not only do dressings containing such compounds spoil the natural grain finish of the fabric, but the waterproof qualities obtained by this method do not usually survive one folding of the top.

DO NOT ACCEPT SUBSTITUTES. Your dealer can easily get you Frank Miller's if you insist upon having this harmless dressing. If he will not, write us direct and we will see that you are promptly supplied.

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Prices East of the Mississippi River
Pints 75 cents each
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Gallons $4.50 each

1 Quart is enough to cover a top and side curtains if properly used. Easy to use—Applied with a sponge or brush.

Seamless Steel Tubing

Over 3,000,000 Feet on Hand.
2000 SIZES. YOUR SIZE IS HERE
ALSO COLD DRAWN SEAMLESS TOOL STEEL TUBING
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Model K Grease Gun

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No Garage or Repair Shop Should be Without This Tool

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Is an Infringement of
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On April 24, 1918, Judge A. L. Sanborn, of the United States District Court in Chicago, handed down a decision in our suit against the Protex Manufacturing Company, Charles Friedlander & Co. and Albert E. Pollock, holding that the Protex gauge is an infringement of all of the claims of our patent No. 1,220,272, awarding us an injunction against all of these concerns and individuals, and an accounting of profits and damages with costs.

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MARTIN GAUGE COMPANY
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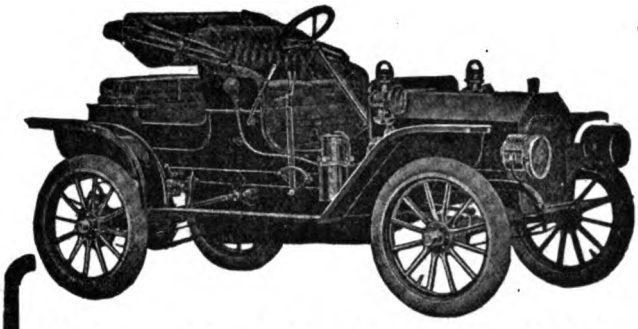


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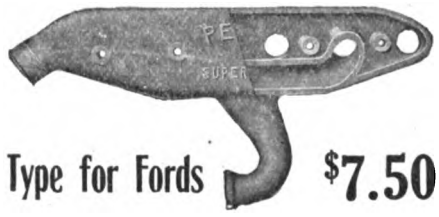
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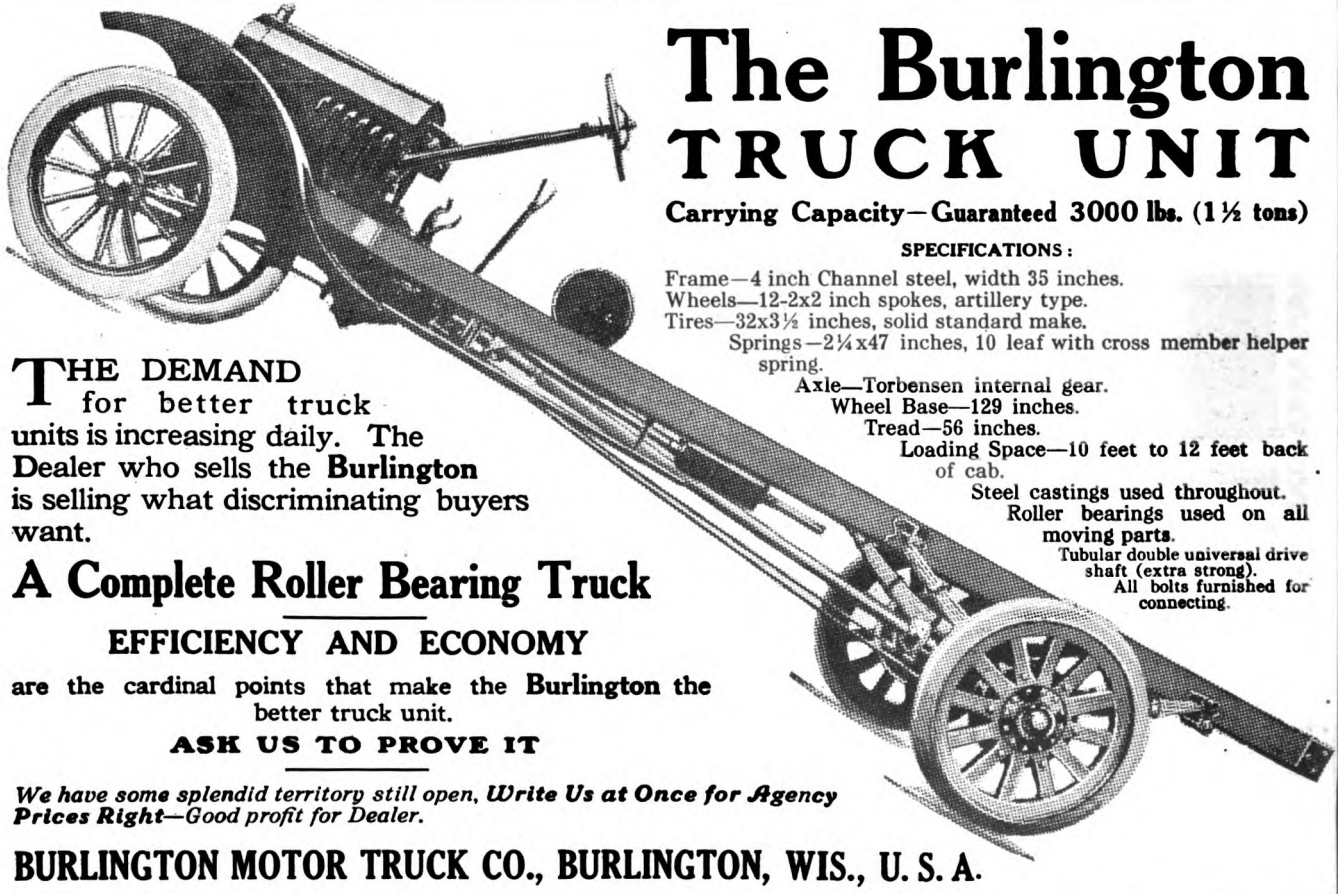
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Carrying Capacity—Guaranteed 3000 lbs. (1½ tons)

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Tubular double universal drive shaft (extra strong).
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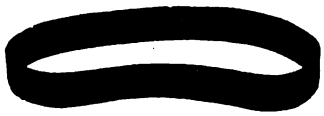
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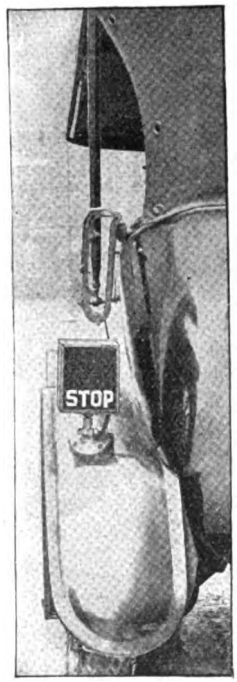
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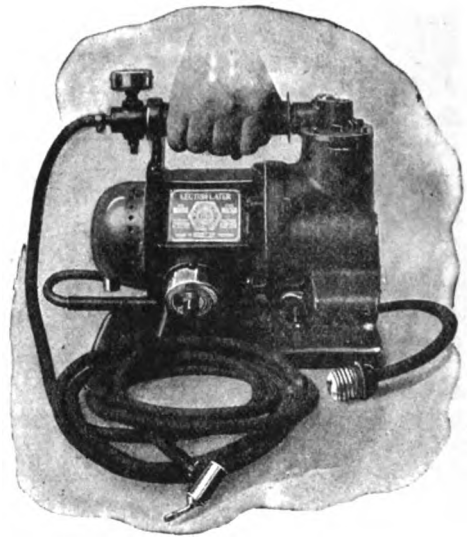


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Keep the Body looking like new.
Don't let it get scratched or shabby.

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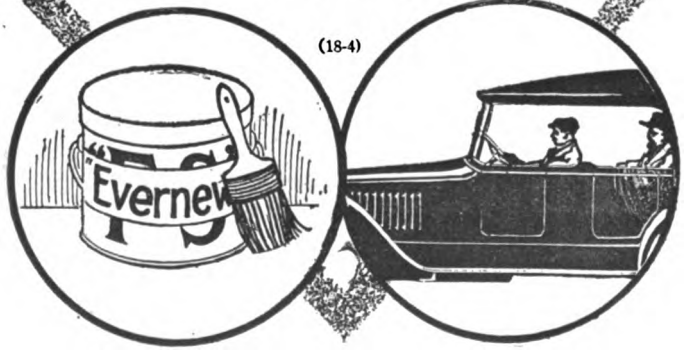
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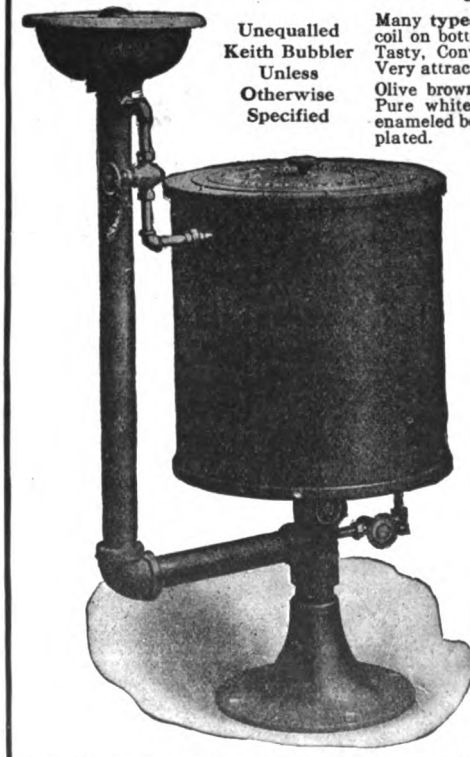
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"Evernew" Auto-Top Dressing revives and waterproofs old tops, yet leaves them pliable.

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For Attachment to Municipal Supply



Unequalled Keith Bubbler Unless Otherwise Specified

Many types and sizes—May have coil on bottom as well as on sides. Tasty, Convenient and Efficient. Very attractive appearance.

Olive brown baked enamel finish. Pure white vitreous cast iron enameled bowl. Fittings nickel-plated.

Wastes above or below the floor.

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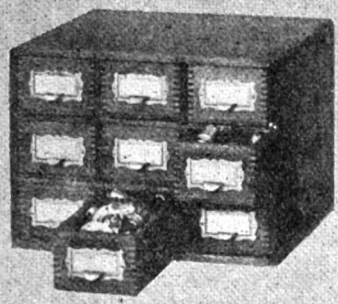
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Presto Bulb Tester

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"They were soldiers lost in the desert, half dead and starved—found sittin' on their packs, that were full of food! Here you're wailin' about no Fords, merchants waitin' for trucks and you 'sit on your pack', watchin' joy ridin' Fords go by the hundreds."

"What good'll they do me, Jim?"

"Get out and get 'em. Put a Hay-Dee Extension on the chassis an' you'll get 115 to 130 inch wheel base; you'll have a truck that has 8 to 9 feet of loadin' space; that'll haul from 500 to 2000 lbs.; you'll give the merchant a dandy truck, with a body complete at less than $800; you'll get a four-time profit on the whole deal; you'll make friends and new business every day—say, what more d'y' want?"

"Hully gee, Al, where did you get that stuff?"

"You write Hayes & Diefenderfer. They'll show you something that'll open your eyes. You'll get a pep and punch in your sales! That's what you need. Go to it and don't wait. Write 'em today!"

HAY-DEE EXTENSIONS for FORD cars

$55 A Business Builder for Live Dealers $60

The only attachment for a Ford making a Truck and re-convertible to a pleasure car at any time. Not a cut or hole to make. Anyone can put it on with a wrench.

HAYES & DIEFENDERFER
1872 Broadway NEW YORK

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MOSCO SPECIALTIES

Mosco Socket Nut and Bolt Holder for Ford Car

A REAL TIME SAVING DEVICE. Takes the place of that other man whose help is usually required for this operation.

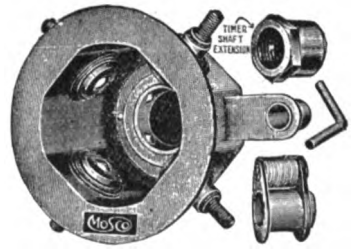
Simply slip MOSCO Nut and Bolt Holder over the top of each engine or Transmission nut or bolt head, the wings protruding above the hex socket engage wall of crank or transmission case and prevent nut or bolt head from turning while the man underneath the car unscrews the bolts. When replacing put head of bolt on top, slip on the MOSCO socket and proceed as in taking out. Made of heavy pressed steel, with reinforced wings welded to body of socket. All case hardened and finished bright.



POSITION ON CRANK CASE BOLTS

Price 15c Each.

Improved Bemus Ball Contact Timer for Ford Car



Cheapest in the long run.
All wearing parts renewed at cost of 27c.
Easier Starting.
Grease Cannot Prevent Contact.
Unbreakable Heavy Steel Shell.
Smoother Running.
Contact is Positive.
Longer Life.
No Fibre Ring to Wear Humpy.

Price $2.25.

YOUR JOBBER HAS THEM IN STOCK

MOTOR SPECIALTIES COMPANY, - - - WALTHAM, MASS.

JEWELL BATTERY GAUGE



Forewarned Is Forearmed

The troubles you anticipate are easily avoided. If you know your battery is running low, it is your own fault if further disaster occurs.

You may avoid some trouble if you follow the manufacturers' instructions to test your battery twice a month, but while such a test, if you make it, which is very doubtful on account of the inconvenience and unpleasantness, is some good, a constant record always before you is infinitely better. This you get through the

JEWELL BATTERY GAUGE

THE EVER WATCHFUL GUARDIAN OF YOUR BATTERY

The dial tells all the story, not in technical terms, but in plain English

SEE THE DEALER OR WRITE FOR DETAILS



Manufactured by
Jewell Electrical Instrument Co.
1646 W. Walnut St., Chicago

Exclusive Sales Representatives
Gray-Heath Company
1440 Michigan Ave., Chicago



20th CENTURY'S No. 6 SELF-VULCANIZING PATCH



This new idea in Patch construction eliminates every possibility of an imperfect tube repair—and the man who looks at an idea to see if he can use it, and not to see if he can get along without it, is the man who wins out every time.

This Patch is Guaranteed Not to Loosen, Leak, Creep or Blow Out. Absolute Satisfaction or Money Refunded

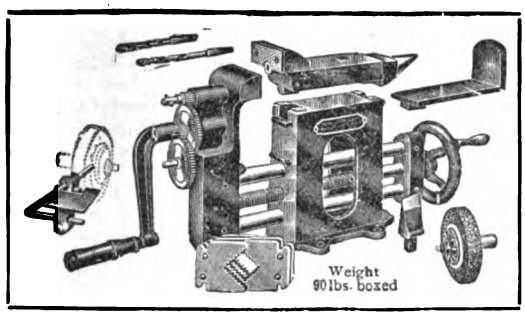
MADE IN 3 SIZES

2¼x16—36 Square Inches, 50 Cents 4x15—60 Square Inches, 75 Cents
6½x20—130 Square Inches, $1.50

If not found with your JOBBER or DEALER, write to us direct.

20th CENTURY TIRE PROTECTOR CO., MIDLOTHIAN, TEXAS

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COMPLETE REPAIR-MAKING OUTFIT

FOR PUBLIC OR PRIVATE GARAGES

One of the most ingenious and handy combinations of tools ever perfected is the

STEWART HANDY WORKER

The picture gives an idea of its completeness, The outfit includes:

Strong practical anvil; powerful vise up to 4½ inches; a sure-grip steel pipe vise; corundum grinding wheel 5 inches by 1 inch; a two-speed drill press with 2 drills; a metal cutting wedge and driving mechanism of three speeds—direct, 4 to 1 and 16 to 1—easily regulated by changing handle grip. It operates grinding wheel, buffing wheel and many other similar tools.

Every car owner and small garage should have this great time and work saver. Every large garage should have at least two. Pays for itself in a short time.

Bought separately these tools would cost $25 or more—complete outfit only - - - - - - $14

Send $2.00 with order for one of these outfits, pay balance on arrival. If not satisfactory in every way, return it and money will be refunded.

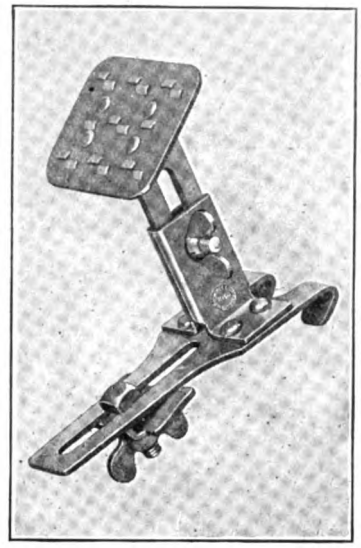
Descriptive booklet mailed on request

CHICAGO FLEXIBLE SHAFT CO.

Dept. M, 12th Street and Central Avenue, Chicago.

UNIVERSAL
EXTENSION PEDAL

The Only Device of its Kind Which Fits Every Type or Shape of Automobile Brake or Clutch



A boon to the lady who drives. Invaluable for the "family" car.

The sliding clamp allows you to adjust this extension pedal either toward dash of car or toward seat.

The Universal Extension Pedal eliminates the use of cushion or other expedient ordinarily used to enable the driver to reach the pedals.

One model fits all makes of automobile pedals without any tinkering or fooling around. There is positively no interference with regular pedals.

It is easily and quickly attached and stays absolutely rigid when adjusted. Heavily nickel plated and beautifully finished. Trade prices on request.

If your dealer cannot supply you with the Universal Extension Pedal —write to us

RICH MANUFACTURING CO.

1777 BROADWAY NEW YORK

PERFECT POWER FROM EACH PISTON



A ONE-PIECE PISTON RING

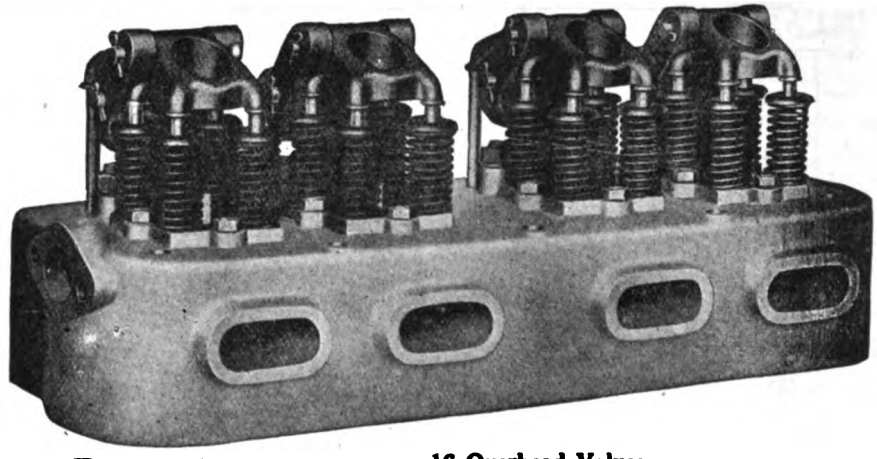
GILL PISTON RINGS are self fitting, ONE-Piece rings of sturdy construction. They have a distinctive joint which absolutely prevents the escape of compression, the formation of excessive carbon, or the pumping of oil into the combustion chamber.

ASK YOUR DEALER for GILL PISTON RINGS, or write us today.

GILL MANUFACTURING CO., 351 W. 59th St., Chicago, Ill.

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Make Your Ford a $3,000 Car from the Standpoint of Motor Service



Price $100

16 Overhead Valves for Fords

SPEED POWER ECONOMY

Speed to climb the steepest hills as you never dreamed of before. Power to double the value of your converted Ford truck, the load carrying capacity of which is only limited to the strength of the rear axle. Speed for the road or for the track to rival the high cost racing cars. A long list of racing car drivers, winners of speed contests, show what you can look for if you want a snappy speedster or a race track winner.

Special equipment for touring car, truck and racing car for $100.00. Extra racing equipment at special low prices. Get our quotations on high speed cam shaft, gray iron pistons, aluminite connecting rods, Lynite pistons and rings complete, counterbalances for crank shaft, nickel steel racing gears 3 to 1 ratio, special oiling systems, fast carburetors and beautifully designed racing bodies. Every Ford owner a likely prospect and every Ford converted truck owner a sure sale. An absolute necessity to every owner of a fast Ford.

DEALERS: Get our distributing terms and quotations on the greatest selling specialty in America. Write today.

LAUREL MOTORS CORPORATION, ANDERSON, INDIANA

Made in the "Puncture Proof" City



IF you've got a good thing—back it up with good advertising copy in the Automobile Dealer and Repairer—don't let your product die of dry rot.

In our "put it over" department we create advertising ideas, draw pictures, border designs and lay-outs which attract the reader's attention—holding, at the same time, the proper commercial value.

We write advertising that will boost your product—bring it from obscurity and, through our medium, put it into the markets of the world.

WRITE OR WIRE

Motor Vehicle Publishing Co.

71-73 Murray Street

New York City

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VULCANIZERS Complete Cure—One Heat **MILLER** TIRES Extra Ply—5,000 Miles

NEW 1918 MODEL "4 CAVITY" EN BLOC

Insulated Air-Cooled Flanges Prevent Marking Tires

Complete---Gas Burner

$150.00



One of the 60 Kinds in Style

From 90c up

We teach Tire Repairing FREE OF CHARGE at factory or by mail.

Extra Ply Tires

Give More Miles at Less Cost

"COG" & "Wrapped" Treads contain 25% more Fabric and Rubber than Standard.

More Fabric Means Less Blowouts— More Miles

New 80-Page Catalog on Request

Exclusive Tire Distributors are Repeating Sales

For Price-Lists—Repeat Sales System

WRITE DEPT. "H" CHAS. E. MILLER ANDERSON, IND., U.S.A.



MELLIN'S

ADJUSTABLE GEAR SHIFT EXTENSION **LEVERS**

Will Fit All Cars (PATENTED)

Over 20,000 in Use



DODGE, OVERLAND "75" and "90," and NASH - - List, $1.25
BUICK, REO, OAKLAND, and all cars having a removable ball on the top of shift lever - - - - - - - - List, $1.50
HUDSON SUPER SIX, OVERLAND "85" and all cars having a solid lever, where the ball is not removable and the extension must be clamped on - - - - - - - - List, $2.00

ALL GOODS SHIPPED PREPAID
WHEN ORDERING GIVE NAME AND MODEL OF YOUR CAR
AT YOUR **Jobber's** *OR WRITE*
M. & H. NOVELTY CO., 857 E. 24th St., Los Angeles, Cal.



KIMBALL TIRES

Are Doubling Profits for Some Dealers

Write for Our Interesting Offer

Write and ask us how we do it. They are positively not seconds, but first-class fresh casings. The following are dealers' prices:

	Non-Skid	Tubes		Non-Skid	Tubes
30x3	$ 8.75	$1.90	32x4	$16.45	$3.05
30x3½	10.95	2.15	33x4	17.55	3.10
32x3½	12.45	2.25	34x4	18.25	3.20

Prices on Other Sizes in Proportion

Send us your order today, accompanied by cashier's draft on Chicago or New York, or money order. Large and small orders given immediate attention. These tires are sold without a guarantee. Write today for territory. Prices will be advanced shortly. Place your order now.

This "Straight Side" Type is Made Also Clincher Type

The Kimball TIRE & RUBBER CO Incorporated

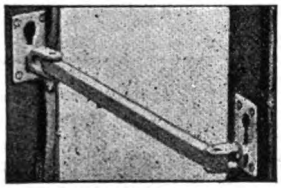
1469 Michigan Av. CHICAGO

HURRICANE HOOK

Motor Car Door Ventilator

HERE'S an ingenious device which promotes the motorist's comfort in summer. Its simplicity, utility and practicality in permitting good ventilation are bound to create a demand.

The Hurricane Hook is a 5-16 in. rod about 6 in. long. One end fastens to the door, the other to the body. It holds the door open wide enough to let in the air, but not far enough to extend beyond the running-board. It fits flush, there are no projections to catch clothing, and it will not rattle or chatter. When not in use it can be lifted off or left hanging down. It is mechanically correct, and adjustable to all makes of cars.



Prepare now for the big demand warm weather will create. Price only 60 cents, boxed individually. The discounts are very liberal. Immediate shipments. Write or wire today.

JOSEPH N. SMITH & COMPANY

DETROIT, MICHIGAN

Don't Chance Losing Your Ford



Install a

NEW YORK "SECURITY" SWITCH LOCK

At $3.25

And Be Insured Forever

Our Switch Lock looks better, gives greater protection, is easier sold and installed, than any other—bar none.

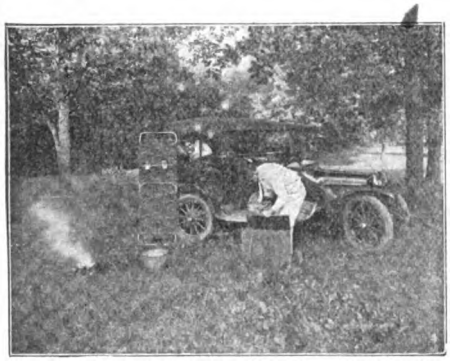
A minute's inspection verifies our claims.

New York Coil Co., 337-340 Pearl St., New York, N.Y.

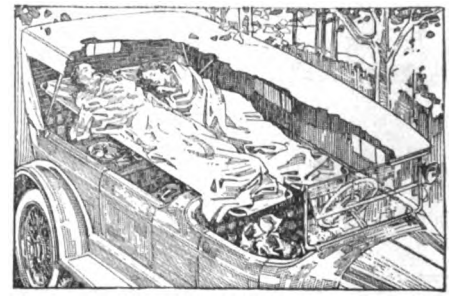
Western Distributors: Gray-Heath Co., 1440 Michigan Ave., Chicago, Ill.

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A KOT THAT FITS ANY AUTOMOBILE



The Any-Kar Auto Kot is the simplest, most inexpensive, and comfortable sleeping bed, that rests over the tops of the rear and front seats. One or two of these kots will fit into any five or seven passenger car. Special size for Fords. The kot is furnished with a heavy ducking and folds to a small package and can be carried while touring the same as a grip.



Price $12.00, f. o. b. Peoria

Manufactured by the

PEORIA AUTO KOT COMPANY,

PEORIA, ILL.

OIL MAKES A PERFECT SEAL. NOTHING ELSE WILL

PERFECT SEAL—OIL CONTROL

NO CARBON-MORE POWER-LESS FUEL

NO-LEAK-O



OIL SEALING PISTON RINGS

Popular Sizes 50 Cents.

Write for free booklet No. 2. Sold by all jobbers.
Every set guaranteed. Statisfactory or money back.

Automobile Accessories Co., 824 W. North Ave., Baltimore, Md.

LARGE PROFITS - SMALL OUTLAY

BEWARE OF IMITATIONS

REPUTATION THROUGH ACTUAL SERVICE. EVERY USER BECOMES A BOOSTER

INSURANCE AGAINST TROUBLE



MOTOR SASCO STRAINER



KEEPS DIRT AND WATER OUT OF THE CARBURETOR

This means a steadier running MOTOR and the elimination of many mysterious stops while on the road.

MOTORISTS have learned that a perfect strainer is an absolute necessity, and so thousands are sold every day.

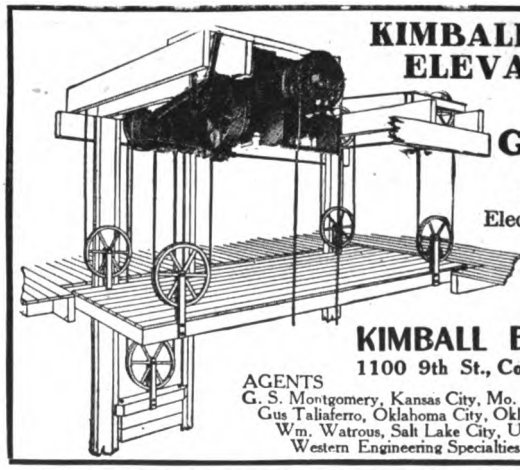
HOW MANY ARE YOU SELLING?

Attractive dealers' proposition. Write for full details.

MANUFACTURED BY

SAGE BROS, Inc., 780 Union St., Brooklyn, N.Y.

KIMBALL AUTO ELEVATORS FOR GARAGES



Hand and Electric Elevators for all Purposes

KIMBALL BROS. CO.

1100 9th St., Council Bluffs, Ia.

AGENTS
G. S. Montgomery, Kansas City, Mo.
Gus Taliaferro, Oklahoma City, Okla.
Wm. Watrous, Salt Lake City, Utah.
Western Engineering Specialties Co., Denver, Colo.

GOOD TIRES AT CUT RATE PRICES



High grade, firsts—not seconds, not blemished or rejected tires, but good tires; tires that will bring every user back for more. Sold without guarantee.

RIBBED TIRES

At these prices are the biggest bargains you ever purchased in your life—Think of it!

PRICES TO DEALERS:

	Non-Skid	Tubes		Non-Skid	Tubes
30x3	$ 8.00	$1.90	32x4	$16.10	$3.05
30x3½	10.25	2.15	33x4	16.80	3.10
32x3½	12.00	2.25	34x4	17.25	3.20

Write now for dealers' proposition, or better yet, rush in a trial order with Chicago or New York draft, express or P. O. money order. If you prefer, send 20% of amount with your order and we'll ship goods C. O. D. subject to examination. Investigate this now. Let us tell you how we can do it.

BUDRICK RUBBER CO.

Dept. B, 36 S. State St., Chicago

Made from Oil-Tempered Spring Steel Wire



PATENTED MARCH 28, 1916

They Remove Carbon Where Others Will Not



Cut out experimenting—get down to business. Why not own a set of FLEXIBLE CARBON SCRAPERS? They are the only scraper on the market that will do a satisfactory job without taking the motor to pieces. Compounds are dangerous. All good mechanics advise scraping carbon. Over 100,000 sets now in use by Auto Mechanics.

Ask Your Dealer or Write

Flexible Carbon Scraper Co. 1421 W. Washington St. Los Angeles, California

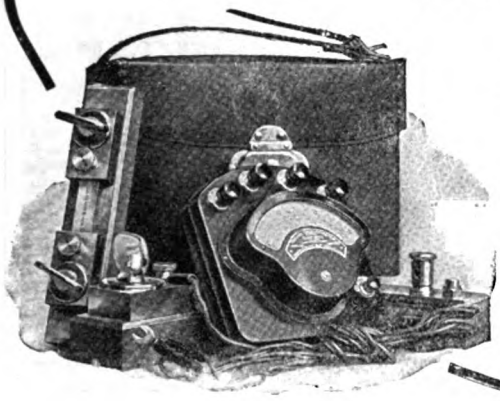
Send for free sample of The Automobile Dealer and Repairer.

MOTOR VEHICLE PUBLISHING CO.

71-73 Murray Street, New York

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Which Garage Man Gets The Money?



If you can repair and adjust Electrical Equipment, you will get the cream of the garage business. With the increasing demand for service of this sort, you must equip to handle the business, or lose it to your more enterprising competitor.

Weston

Model 280

GARAGE TESTING INSTRUMENT

is your one great and urgent necessity to enable you to locate electrical troubles quickly and apply the proper treatment to remedy them. Its possession will place you a long way ahead of your competitor not so equipped. This instrument is extremely accurate, durable and serviceable. It is the most practical electrical equipment you can install.

The Weston Company is pre-eminent throughout the world in the production of highest grade Electrical Precision Instruments.

WRITE US NOW for our Special Proposition to Garage Owners. It will show you how you can handle electrical apparatus intelligently and profitably.

WESTON ELECTRICAL INSTRUMENT CO., 2 Weston Ave., Newark, N. J.

23 Branch Offices in the Larger Cities

GB TITAN GB

STORAGE BATTERIES and TITAN PARTS

Fulfill every need of the Repairman. They represent the highest skill in the Art of Battery Making.

Batteries for Every Car. Parts for all Batteries of Every Make. Prompt Shipments from Stock.

Write for Bulletin.

GENERAL LEAD BATTERIES COMPANY

CHAPEL STREET AND LISTER AVENUE

NEWARK, N. J.

NO NEED TO KEEP A STOCK OF HEADLIGHT GLASSES

This circular glass-cutter cuts perfect Headlights 2 to 20 inches in diameter. Cuts plain and plate glass, any thickness. In demand by autoists. Earn liberal profits.

"RED DEVIL" TOOL CATALOG FREE

SMITH & HEMENWAY COMPANY, Inc.
83 Coit Street
IRVINGTON, N. J.



Style No. 033, sample 50 cents

Discount to Dealers

GTD



For "Every Other Car"

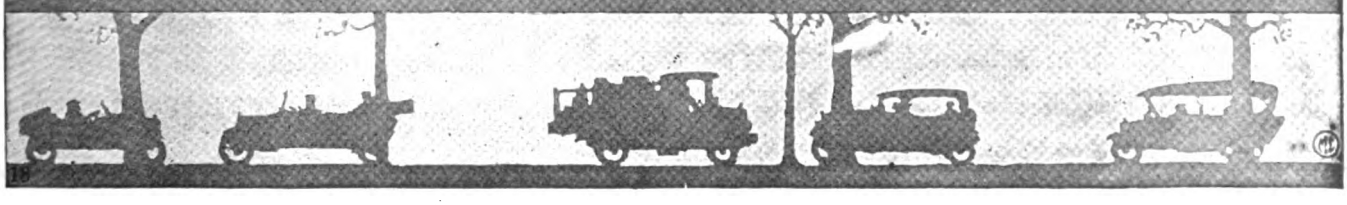
Here is a complete Automobile Screw Plate for Ford cars, consisting of Taps, Dies, Reamers, Stocks, Tap Wrenches fitted for the requirements of the Ford. It is called a Garage Repair Set, but is equally valuable to the dealer and car owner—in fact everyone who has occasion to care for a Ford car can use and needs this set. It is furnished in a well-made wooden box, handy for general use and to carry on the road to repair jobs.

As Ford led in standardized production of automobiles, so has G. T. D. led in the standardization of screw threads. This set consists of selected G. T. D. products to fit the Ford requirements. It is a sound investment, as proven by the large numbers sold and in use.

On sale by the best dealers—write us for particulars and booklet of Auto Tools.

GREENFIELD TAP & DIE CORPORATION

Greenfield, Massachusetts, U. S. A.

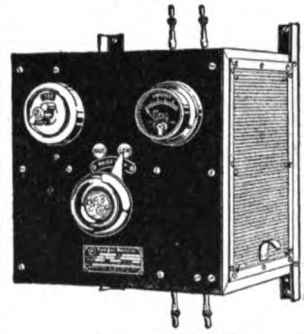


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VULCAN QUALITY
AUTOMOBILE SPRINGS

SPRINGS IN STOCK FOR ALL CARS
90,000 Springs. 588 Types.
6—FACTORY BRANCHES—6
St. Louis, Mo. 1402 Chestnut St. Minneapolis, Minn. 1024 Hennepin Ave.
Reading, Pa. 538 Franklin St. Dallas, Tex., 209 Houston St.
Sumter, S. C. 29 Caldwell St. Richmond, Ind. Colonial Bldg.
FACTORY RICHMOND, IND.
JENKINS VULCAN SPRING CO.

FOR BATTERY CHARGING



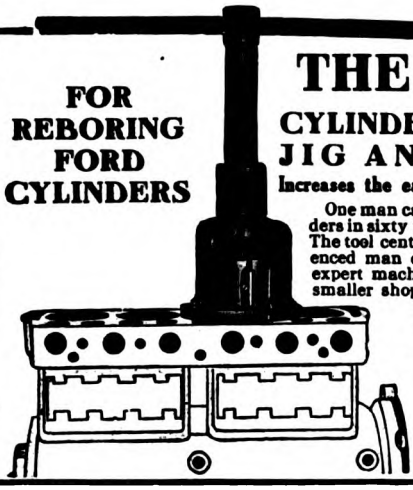
Tungar RECTIFIER

The 6 amp. 75 volt Tungar Rectifier is a practical device demonstrated by actual service. It equips your garage for efficient battery charging at a much lower cost than any other reliable device of similar capacity.

Ask for Folder 63951

GENERAL ELECTRIC COMPANY
General Office: SCHENECTADY, N. Y. 35 A-3

FOR REBORING FORD CYLINDERS



THE DAVIS
CYLINDER REBORING JIG AND REAMER
Increases the earning power of your shop

One man can rebore a set of four cylinders in sixty minutes with this machine. The tool centers itself, and an inexperienced man can do as good a job as an expert machinist. With this tool the smaller shops and garages can rebore cylinders and guarantee the work to be as good as the larger dealers with their expensive machinery. Makes the motor better than new. Write for price and full particulars.

The Hinckley Machine Works
Hinckley, Ill.

DIXON'S DEALER ELECTRO SERVICE

The biggest factor in developing your business in the service given your customers. With this in mind and realizing that it is difficult in a busy season to prepare advertising, we have prepared for your convenience a series of ten advertisements. By catchy illustrations attention is attracted to them. Each is in electro form with ample space for your name.

DIXON'S GRAPHITE Automobile LUBRICANTS

are being advertised in the newspapers of the big radiating centers throughout the country and also in farm and automobile papers. We are confident that the demand created by this advertising if backed by local dealers, will increase your sales of Dixon's Graphite Automobile Lubricants at a minimum expense.
Write us at once for proofs of these electros so that you can start your advertisements now. Please address Dept. 184-G.

MADE IN JERSEY CITY N. J., BY THE
JOSEPH DIXON CRUCIBLE CO.
ESTABLISHED 1827

STICK!!

AUTO EQUIPMENT MANUFACTURERS

If your advertising in *"The Blacksmith and Wheelwright"* is founded on the deeply rooted intention to *stick* you'll catch the worth-while trade of the Country Blacksmiths in towns your representative never sees.

The size of a ¼-page advertisement is 4¾ x 7 inches that's a big quarter—but don't just "try it" for one month—*stick for one solid year*—so that your advertising may gain momentum—then you can't lose!

We can tell you something that perhaps you do not know—if you'll write to the address below

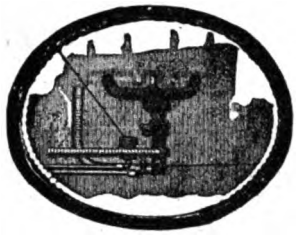
M. T. RICHARDSON COMPANY

Publishers of THE BLACKSMITH AND WHEELWRIGHT
71-73 MURRAY STREET NEW YORK CITY

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SAVE 60% WHEN YOU RUN YOUR FORD

Use Kerosene



DRIVE YOUR CAR TWICE AS FAR AND BUY YOUR FUEL FOR LESS THAN HALF.

OFFICIAL TEST
DETROIT AUTOMOBILE CLUB
June 4, 1918

UNDER instruction of Mr. W. S. Gilbreath, manager of the Club, I acted as observer of a test run made with your Kerosene Equipment on June 3rd.

The equipment in question was attached to a 1914 Model T Ford, which was not in the best mechanical condition at the time.

One and one-fourth gallons of Kerosene were consumed in the test, a distance of 37 7-10 miles being traversed, much of this on ordinary country roads. About eighteen miles of the trip was through fairly heavy traffic. A speed of 22 miles per hour was maintained.

Performance of the car was equal to, if not better than could have been done on other types of fuel.

DETROIT AUTOMOBILE CLUB,
E. W. SULLIVAN, Observer

Buy Now

Order direct from this advertisement. Enclose purchase price, $25 for complete Equipment on 30 days trial.

If you find it doesn't do all that you expect—if you think it isn't an *immense money saver*—return it within a month from date shipped, and get your money back. No risk. Send order today on

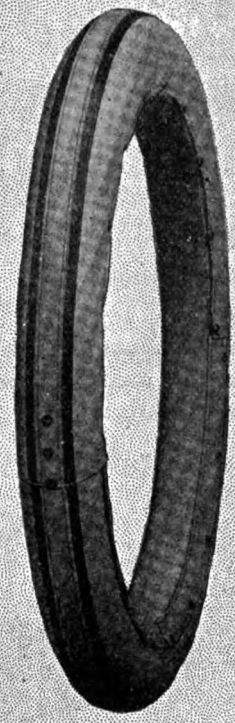
Absolute Guarantee

A USER SAYS: "We have certainly gotten some positively wonderful results out of this carburetor and would not go back to straight gas on a bet."
"THE HUNTLEY," Winona, Minn., May 23, 1918.

Free Descriptive Circular for the Asking
Some Sales Territory Still Open

KEROSENE EQUIPMENT CO.
393 KRESGE BUILDING, -:- DETROIT

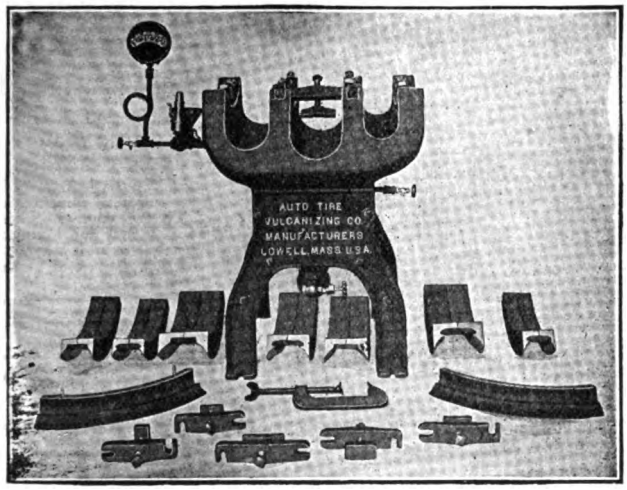
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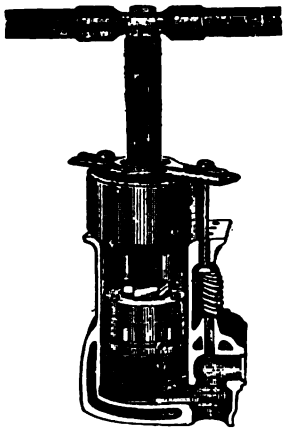
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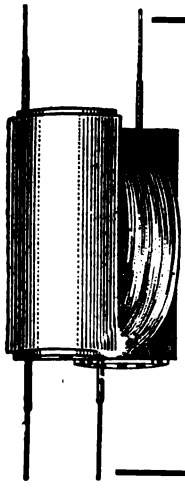
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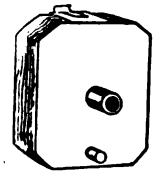
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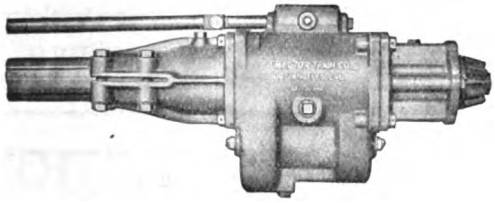
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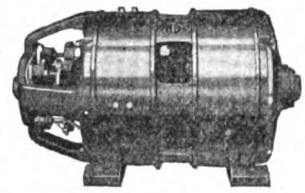
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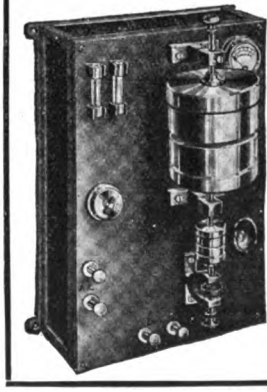


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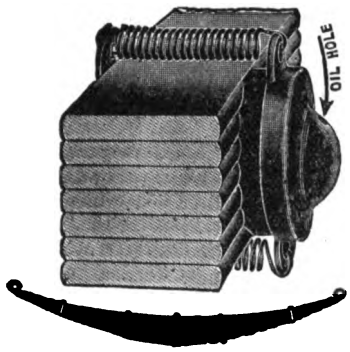
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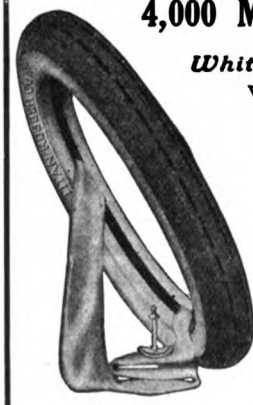
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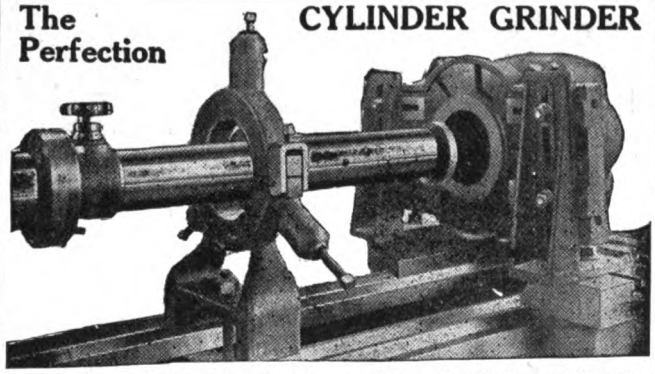
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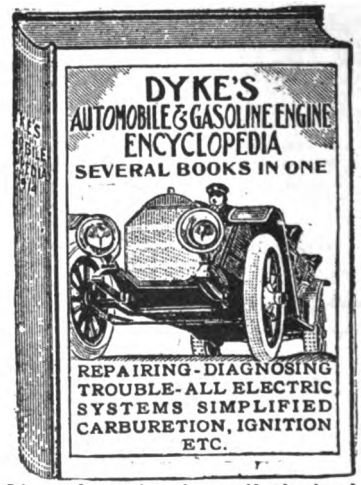
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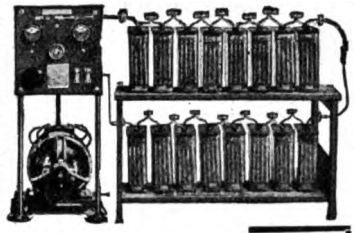
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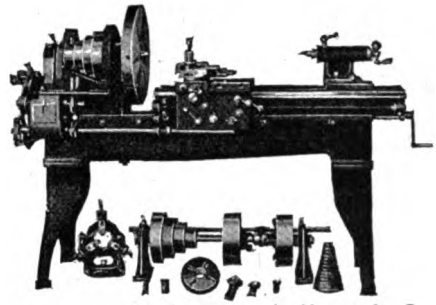
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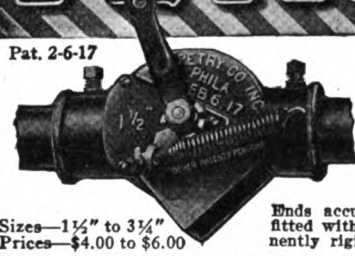
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PETRY CUT OUT

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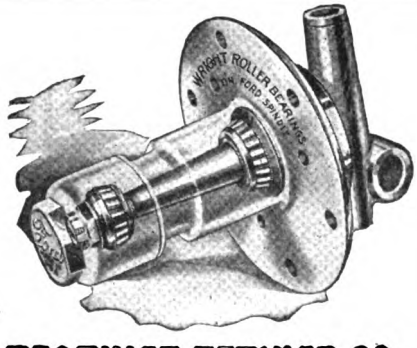
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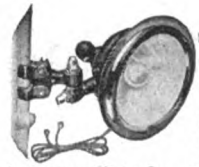
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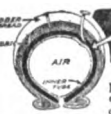


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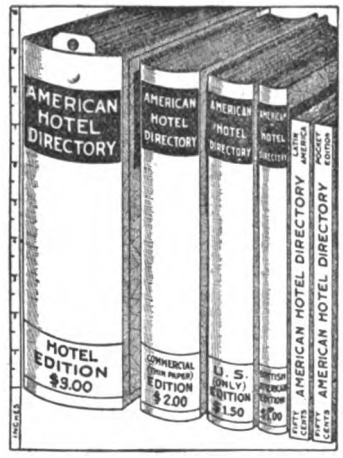
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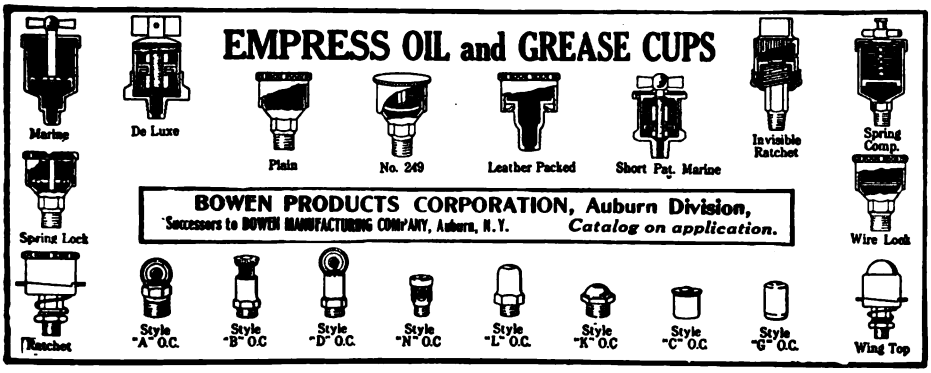
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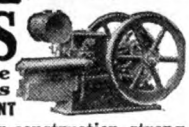
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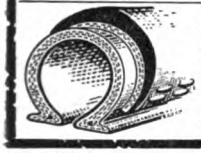
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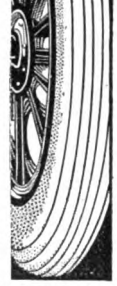


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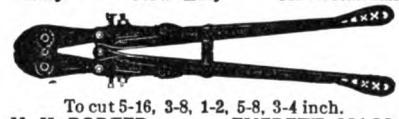
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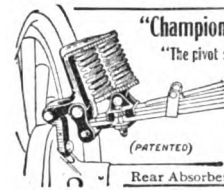


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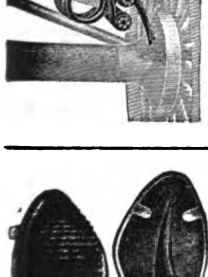
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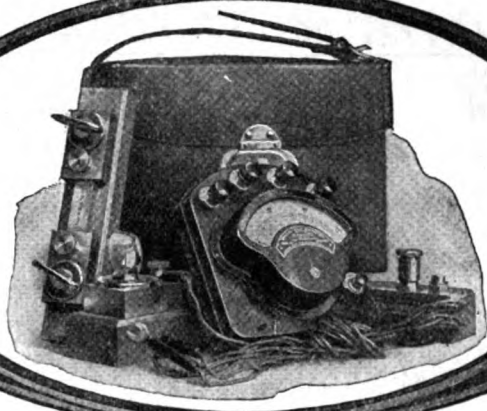
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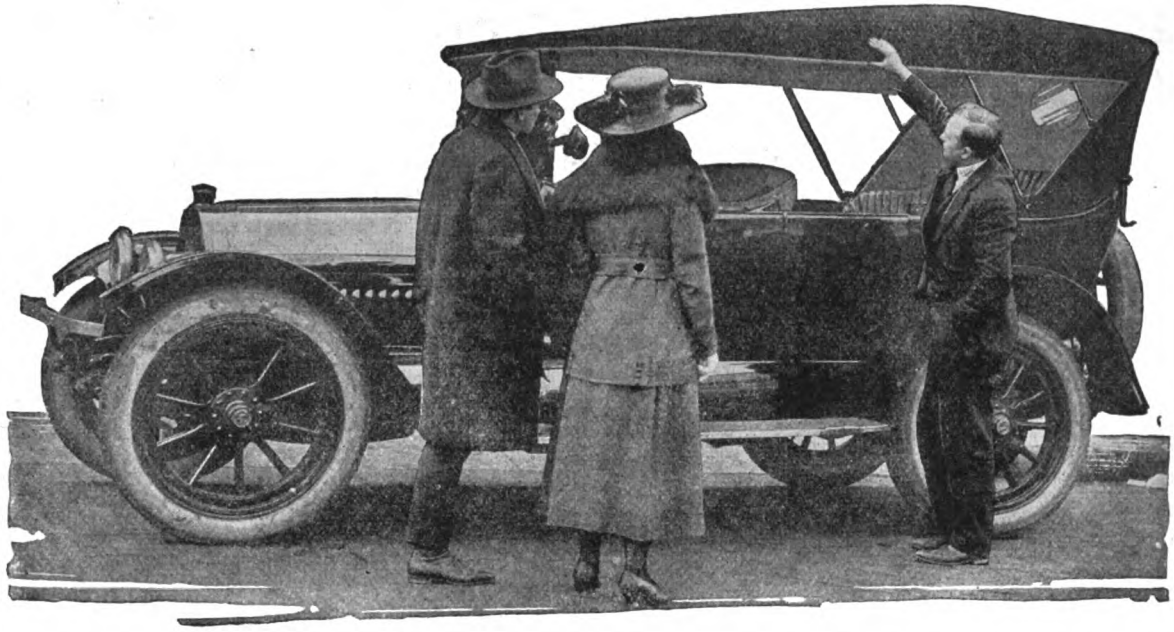
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The Replacement Spring

That's the message now being carried to millions of car-owners through the pages of National publications such as:

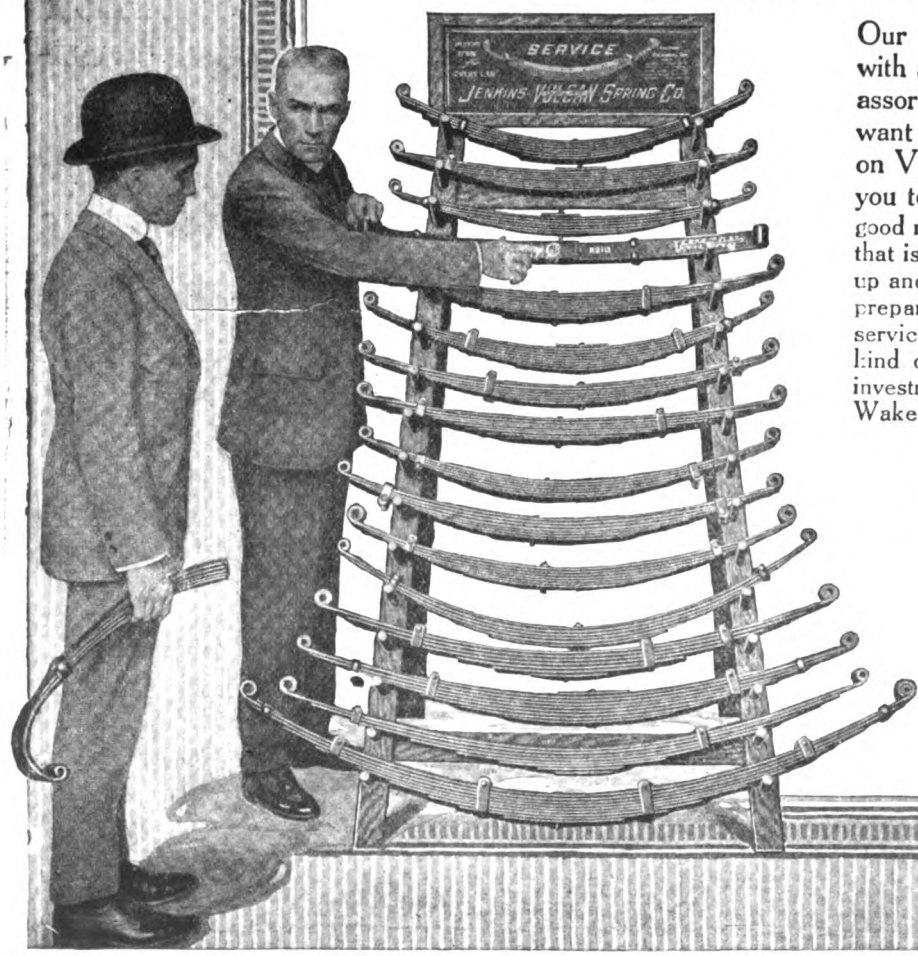
Saturday Evening Post,
Colliers Weekly,
Leslies Weekly,
Automobile Blue Book
and all Trade Papers.

To Dealers: You **need** this display rack full of **quick-selling,** replacement Vulcan Springs—and you need it **now.**

If you are one of the 3,000 live dealers who already have it, see that your stock is complete. Order what is short.

Here is something you want—

Real Profit With Small Investment



Our display rack is FREE to you with an order for one dozen or more assorted Vulcan Springs. Owners want service. They are already sold on Vulcan Springs. Now it's up to you to cash in on this advertising and good reputation and pocket the big profit that is yours. When the car owner drives up and asks you to "put on Vulcan"—be prepared. He wants **service**—real service. Give it to him. You need this kind of profit that requires no growing investment. Vulcan Springs move fast. Wake up!

Write Today for Our Spring Rack Proposition.

JENKINS VULCAN SPRING CO.

Richmond, Ind.

Factory Branches

St. Louis, Missouri 1402 Chestnut Street
Minneapolis, Minn. 1024 Hennepin Ave.
Dallas, Texas 209 South Houston St.
Reading, Pa. 538 Franklin Street
Sumter, S. C. 29 Caldwell Street

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The MUNGER "Always Tight" expansion joint

MUNGER "Always Tight" Piston Rings

The upper groove of a piston always becomes worn before the other grooves are affected, so that a piston ring of regular size will not fit snugly. To meet that condition, each complete outfit of Munger "Always Tight" Piston Rings includes one *overwidth* ring for each piston and a Re-grooving Tool. With this tool the car owner or garage man can straighten-up a worn groove so an overwidth ring will fit true and properly.

Munger "Always Tight" Piston Rings conform to the shape of the cylinder and the Expansion Joint keeps them gas-tight until worn out.

SPLITDORF ELECTRICAL CO.
Newark, New Jersey

Splitdorf Branch Houses and Service Stations:

Atlanta	10-12 E. Harris St.	Minneapolis	816 Hennepin Ave.
Boston	68 Brookline Ave.	Newark	278 Halsey St.
Chicago	2513 S. Michigan Ave.	New York	7 West 61st St.
Dallas	402 S. Ervay St.	Philadelphia	210 N. 13th St.
Detroit	1295 Woodward Ave.	Pittsburgh	5943 Ellsworth Ave.
Kansas City	1827 Grand Ave.	San Francisco	1022 Geary St.
Los Angeles	1215 S. Hope St.	Seattle	1628 Broadway
		Toronto	469 Yonge St.

Accessory Dealers and Garage Men!

Any jobber will supply you with Munger "Always Tight" Piston Rings. Order them now!
List price for all sizes up to 3¾ in diameter, $1.25 per ring.
With each complete outfit of rings, a *Munger Piston Re-grooving Tool* and a *Munger Ring Insertion Tool* are supplied without extra charge.

The MUNGER "ALWAYS TIGHT" PISTON RING OUTFIT— 8 "Always Tight" Rings (Regular Size) 4 "Always Tight" Rings (Overwidth) 1 Regrooving Tool 1 Ring Insertion Tool

The Munger Re-grooving Tool in position for cutting Testing width of groove with an overwidth ring

A Munger "Always Tight" Piston Ring being slipped over the Munger Ring Insertion Tool

Showing how easily Munger "Always Tight" Piston Rings can be placed in the piston grooves with the Munger Ring Insertion Tool

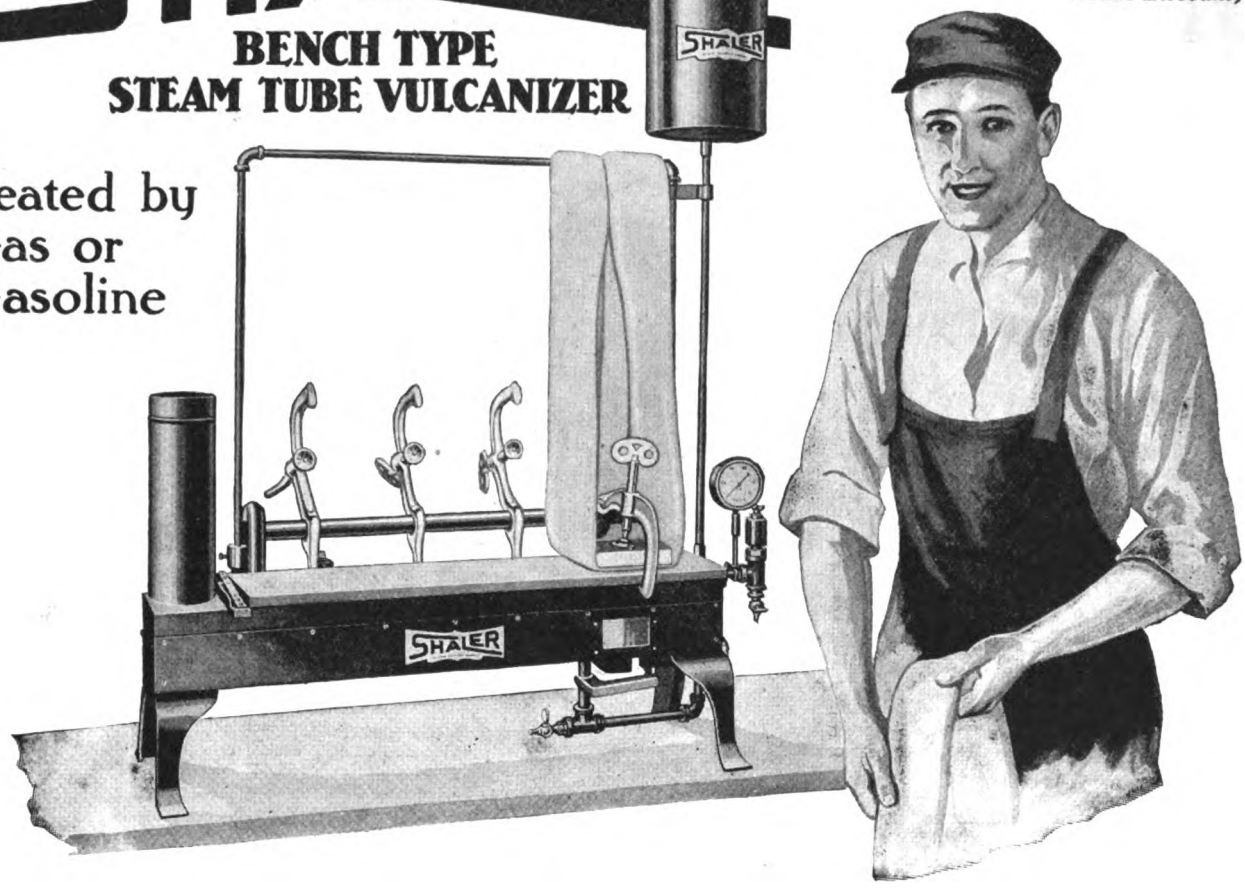
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SHALER

BENCH TYPE
STEAM TUBE VULCANIZER

Type "L-40"
Price $35.00
(Subject to Trade Discount)

Heated by Gas or Gasoline



Will Pay for Itself in a Week

This SHALER Tube Vulcanizer is the most popular vulcanizer ever put on the market. Thousands of them are in use in Garages and Repair Shops, and many of them have more than paid for themselves the *very first day* they were used!

You can do every kind of tube repairing with this vulcanizer, just as well as with the most expensive machines costing many times as much.

It repairs four tubes *at one time*—and vulcanizes perfectly any size or shape of puncture or cut up to two feet in length. There is no vulcanizer made that will turn out better work or do it more quickly—why think of paying a big price for a vulcanizer that will do no more than this practical SHALER Tube Vulcanizer!

Easy to Operate—Automatic Heat Control—SAFE!

Even a boy can make perfect repairs with this vulcanizer. You don't need experience. Your ordinary garage help can repair any size or kind of inner tube—and make a perfect job of it.

The SHALER Vulcanizer is the only one that has automatic heat control. Requires no watching or regulating, yet there is no danger of overheating tubes or undercuring the rubber. Takes up very little room in your garage or repair shop—it can be placed on any work bench and moved about at will. This vulcanizer uses little fuel—is furnished with either gas or gasoline burner—or both can be had if desired.

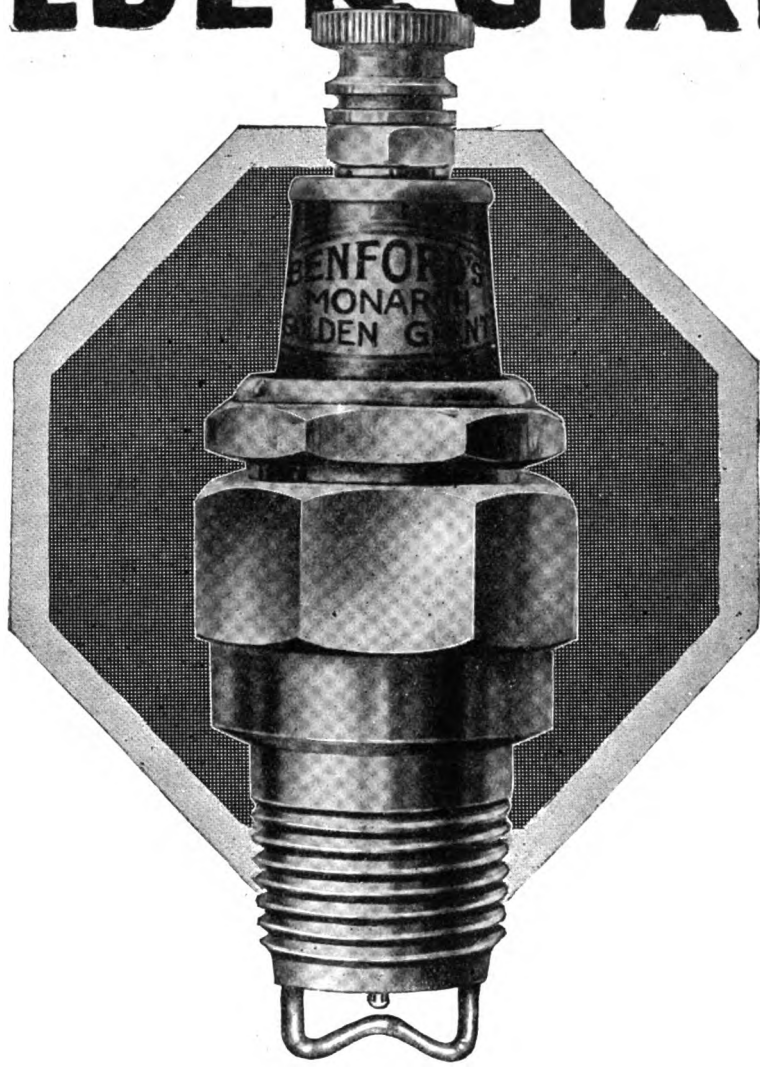
All Jobbers Sell This Popular Outfit

Ask your jobber now for complete information about SHALER Bench Tube Vulcanizers—or send to us for the new SHALER Catalog of Shop Vulcanizers. Investigate—but do it NOW!

C. A. Shaler Company, 806 Fourth Street, Waupun, Wisconsin
Oldest and Largest Manufacturers of Vulcanizers

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BENFORD'S GOLDEN GIANT



FINISH

The Refinement of Quality

A BEAUTIFUL picture is framed beautifully. A car that is an engineering triumph naturally is crowned by a fine body.

Uncle Sam's battlers on land and sea are splendid in their trig, smart uniforms. We dress them that way to show our pride in them.

At the race tracks the sleek thoroughbreds with their painted hoofs show the owners' appreciation of nature's finest work.

Appropriate, all these—are they not?

Appropriate, in exactly the same degree, the coat of pure gold for the Golden Giant.

The Finest Spark Plug Made

BENFORD MFG. CO. -:- Mt. Vernon, N. Y.

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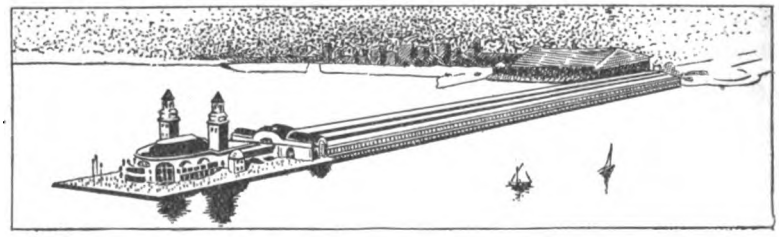
That Product of Yours

is all O. K., but if you ever expect to make a REGULAR business out of it—that product will require the "tonic" of advertising, as no permanent foundation can be obtained without it.

The day of placer mining is over—one digs for his gold nowadays.

Dig With a Full Page Advertisement IN THE CHICAGO SHOW NUMBER OF THE Automobile Dealer and Repairer

This number comes out about the middle of August — beforehand enough to do you a world of good in connection with **The Truck, Tractor and Accessories Exposition,** to be held Sept. 14th to 21st, inclusive, 1918, at the five million dollar Municipal Pier, Chicago.



MUNICIPAL PIER, CHICAGO

If we can hear from you as soon as you read this—

OUR "PUT IT OVER" DEPARTMENT

will prepare special copy for you.

In this department we create advertising ideas, draw pictures, border designs and lay-outs which attract the reader's attention—holding, at the same time, the proper commercial value.

We write advertising that will boost your product—bring it from obscurity and, through our medium, put it into the markets of the world.

If you're going to dig—dig with a full page ad—in the August Chicago Show Number

WRITE OR WIRE

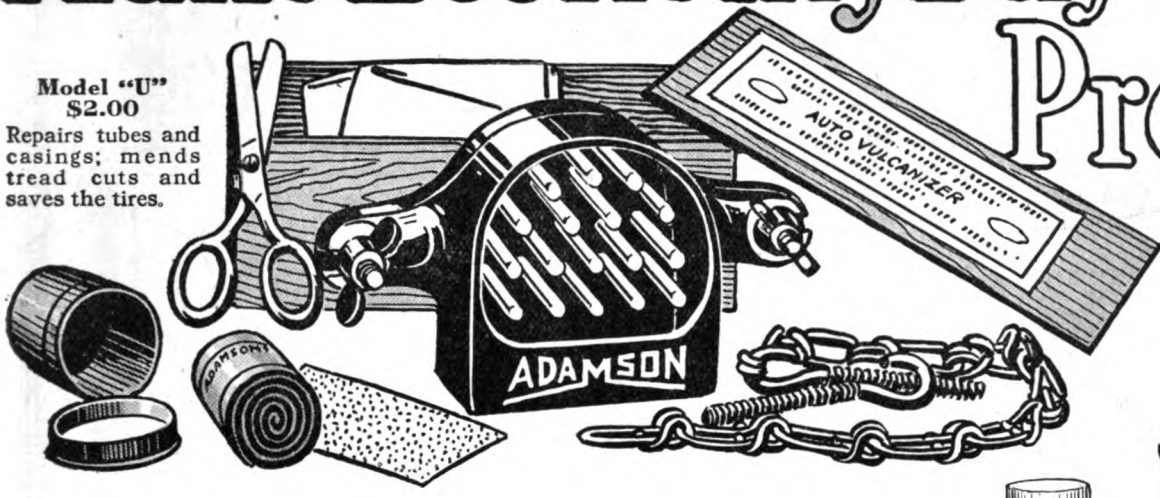
Motor Vehicle Publishing Co., 71-73 Murray St., New York City

OUR BOOTH AT THE BIG SHOW WILL BE 9-A ACCESSORIES SECTION

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Make Economy Pay YOU Profit!

Model "U"
$2.00
Repairs tubes and casings; mends tread cuts and saves the tires.



Model "E" $1.00
Repairs tube punctures in five minutes. Uses Adamson Dry Fuel or gasoline.

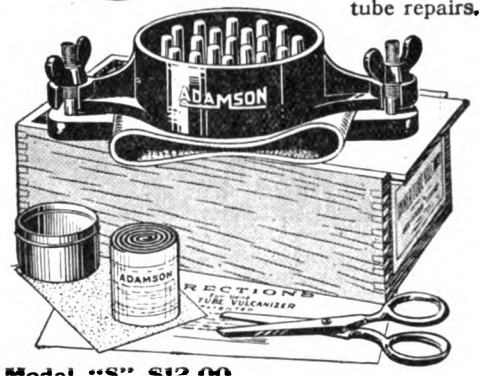


Model "T" $1.50
For all inner tube repairs.

Every motorist is seeking a way to make his casings and tubes last longer, and protect himself against the rising costs and threatened shortage of new tires.

Adamsons best meet this increasing demand because they not only mend *tubes,* but vulcanize cuts and abrasions in the *casings,* and keep moisture and dirt from getting into the fabric and destroying the tire. That means thousands of miles more tire service at the cost of a few cents.

Profit by this opportunity. Display and sell the Adamson line—a vulcanizer for every repair a motorist can make; surest in results and cheapest to buy and use; all models burn common gasoline, the fuel that is always dependable and easy to get.



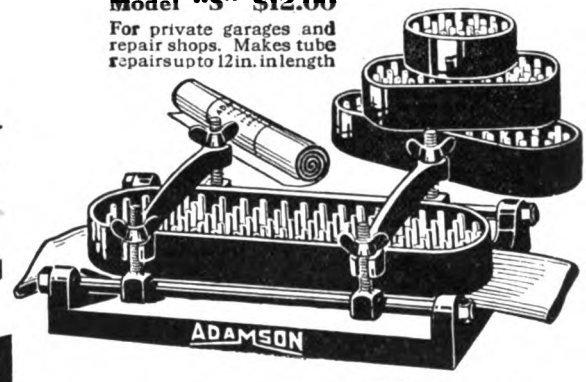
Model "S" $12.00
For private garages and repair shops. Makes tube repairs up to 12 in. in length

Write for Store Displays and Dealer Helps.

ADAMSON MFG. COMPANY

EAST PALESTINE, OHIO

We also make Ford Brake Shoes, Lined and Unlined



ADAMSON

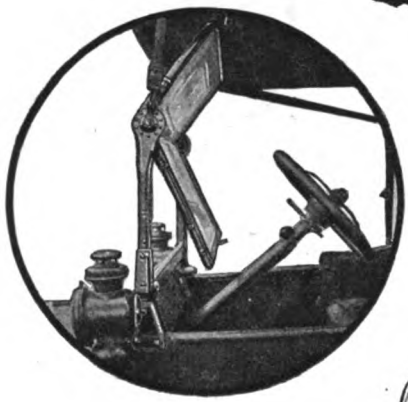
THE COMPLETE LINE OF
VULCANIZERS

Adamson Repair Gum
Essential for best results with any portable vulcanizer



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Cool driving!



Shurnuff TRADE MARK REG. U.S. PAT. OFF. WINDSHIELD VENTILATOR

Are You Handling This Fast-Selling Ford Fixture?

You don't have to be told how hot it gets in the front part of a Ford in Summer and how much every Ford owner wishes he could open the windshield from the bottom and bring the breezes down to his feet and legs. Now you can "cash-in" on that situation.

In the *Shurnuff* Ventilator Windshield you can offer Ford owners all the ventilating and rain and dust-tight features that are given by the windshields of high priced cars. It consists of two black enameled uprights so shaped as to make the sides of the windshield rain-proof. A metal and rubber strip fastens to the cowl and makes it rain-proof at the bottom also. Metal handle supplied for lower sash so that it can be pulled backward. Also four small corner plates for reinforcing.

Can be installed in 30 minutes.
The Ford owner can do the work.

Each ventilator set is packed in a labeled carton and makes a good showing on the shelf. Six sets are packed in a dealer's case. Price retail, per set complete $7.50, $7.75 west of Rockies, $11.25 in Canada. Order a half dozen cases from your jobber today—you can quickly sell that number, and six Ford owners in your section enjoying cool driving will bring in more buyers right along.

Dealers: *Shurnuff*
Necessities for Ford cars are sure-enough fast sellers. All guaranteed. All packed in attractive cartons for self display. Carried by jobbers everywhere. Write for literature.

Shurnuff Mfg. Co.
Dept. D, St. Louis, Mo.
Sales Dept.,
Zinke Co., Chicago, Ill.



Shurnuff Running Board Fender Support stops sagging of running board, eliminates excessive vibration of front fender, reduces shocks and stabilizes the car. Needed on all Fords. Saves battery from damaging vibration.

Price, per pair	$4.50
West of Rockies	4.75
In Canada	6.75



Shurnuff Grease Retainers. Grease leaking from rear axle of Fords rots the tires, causes brakes to lose their efficiency and makes a dust-collecting mess on wheels, brake and axle housing. The *Shurnuff* EFFECTIVELY stops these grease leaks.

Price, per pair	$0.90
In Canada	1.35



Shurnuff Combination Manifold combines intake and exhaust so that heat from latter dries incoming gasoline and vaporizes it perfectly. Result: smoother running, more power, more miles per gallon, less carbon.

Price	$9.00
West of Rockies	10.00
In Canada	12.50

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Announcing a Complete Circuit of Service

Official factory records—

Genuine parts for repairs or replacements—

Expert factory trained workmen to make these repairs and adjustments—

An organization whose sole object is the rendering of service on Delco, Klaxon and Remy electrical equipment—

This is United Motors Service Inc.

On July 1st all the field service of the manufacturers of Delco, Klaxon and Remy was absorbed by United Motors Service Inc.

This organization now consists of six branches where you may obtain repairs or replacements on Delco, Klaxon and Remy electrical equipment; five branches and fifteen service stations rendering service on Remy only; 66 service stations giving service on Klaxon exclusively.

We are rapidly developing these and other units to furnish our threefold service and bring it within reach of everyone interested in these equipments.

Delco



KLAXON

REMY

MOTORS SERVICE
Trade Mark

United Motors Service Inc.

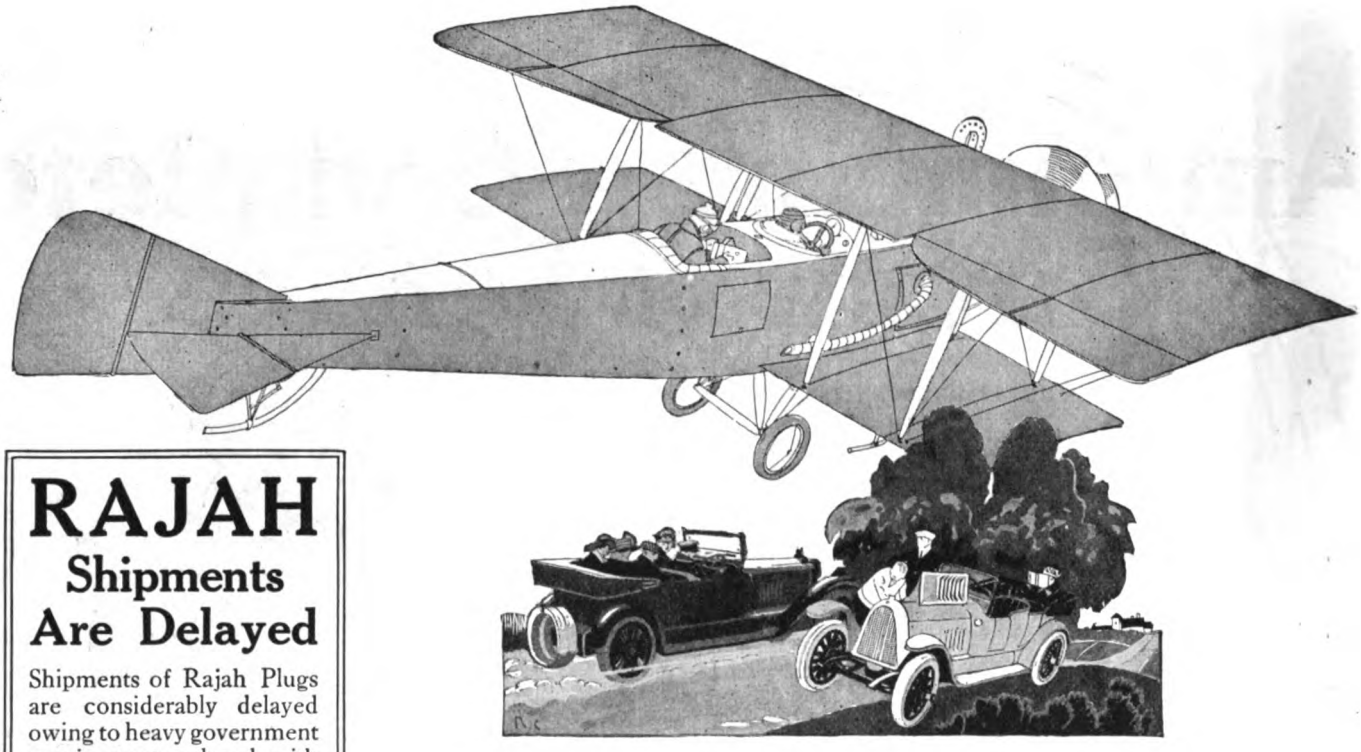
GENERAL OFFICES:

Detroit Michigan

Delco, Klaxon and Remy Direct Branches in the following cities:	*Remy Direct Branches in the following cities:*
Kansas City	Denver
Chicago	Minneapolis
Detroit	Cleveland
Los Angeles	Boston
San Francisco	Atlanta
New York	

15 cities in which there are Remy Service Stations
66 cities in which there are Klaxon Service Stations

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RAJAH

Shipments Are Delayed

Shipments of Rajah Plugs are considerably delayed owing to heavy government requirements placed with the Rajah factory.

In some sections of the country Rajah-Plugs are almost unobtainable. *Don't let this happen to you.*

We strongly urge you to place your orders now, anticipating your requirements as far ahead as possible to insure your having stock on hand.

Rajah Terminals and Adapters

are furnished so that Rajah Plugs can be used with any car.



Rajah Regular and Ferrule Clip Terminals

Adjustable to any cable and with ferrule to fit any cable. With the extra collar supplied both can be used with any make of plug.



Rajah Thumb Nut and Stud Terminals

The Thumb nut is an adapter for Dodge, Ford, Hup, Hudson, Maxwell, Mitchell, Packard Twin Six and Pullman. The Stud for Buick, Chevrolet and Oldsmobile.



Rajah Ball Terminal

Adapter for Franklin, Locomobile and Willys-Knight.

Manufactured by

Rajah Auto-Supply Co.
Bloomfield, N. J.
Sales Department
Edward A. Cassidy Co.
280 Madison Ave., New York

Airplane ignition *must* be reliable

The pilot in the air demands constant, unfailing ignition and the maximum of power under unusual conditions. That is why he chooses Rajah Spark Plugs for his plane.

You can provide your customers with the same trustworthy ignition, for the same Rajah Plugs that are used by aviators, racing car drivers and hill climbers are available for all car owners. No *claim* of quality can weigh against *proof* of this kind.

Rajah Plugs achieved their reputation by delivering exceptional service under severe and unusual conditions. In offering them to your trade you are passing along this exceptional service. You can guarantee it and Rajah will back you up.



NOTE—Sell a complete set of Rajah Plugs to each customer. Then you will be giving them 100% efficiency in quick response, increased power and absolute dependability.

RAJAH
SPARK PLUGS

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Dealers! Over 700,000 Car-Owners Are Waiting for This Accessory!



Needed on 104 Makes of Cars

Liberal Selling Terms

THE MASTERS GASOLINE METER

has been produced in response to a definite demand for an accurate gasoline consumption meter for motor cars. This meter can be installed in a few minutes on any car with a vacuum fuel feed. It keeps an accurate record to the tenth of each gallon used.

The hundreds of thousands of users of automobiles with Vacuum Feed Systems are positive prospects for the Masters Meter. Dealers will find it a profitable accessory.

In keeping a record of the gasoline consumption, this meter encourages the car owner to keep his car in trim. Insufficient lubrication, poor carburetion, bad valves, weak ignition and other motor car ailments invariably result in increased consumption. For this reason it is of extreme importance that an accurate record of the consumption be kept where it will come under the observation of the driver daily.

The consumption record shown by the Masters Meter on the cowl right before the driver's eyes cannot be overlooked. Today the car may be making 17 miles per gallon—tomorrow only ten. The Masters Meter forces the driver's attention to these differences, encouraging him to investigate the causes.

Dealers who are turning to accessories to hold up their profits, must realize that the time is ripe to market this Gasoline Consumption Meter. It makes a strong appeal to the hundreds of thousands of owners of such cars as the Franklin, Haynes, Peerless, Chandler, Dodge, Hudson, Mitchell, McFarlan, Buick, Chalmers, Chevrolet, Cole, Grant, Jackson, Nash, King, Kissel Kar, National, Oakland, Overland, Oldsmobile and 83 other makes. They have been waiting for just such a solution of their fuel record problem. They are reading the Masters Gasoline Meter advertisements in more than fifty different publications.

Get ready to answer your customers' inquiries and to fill their orders. Send for a sample today, with circulars, etc.

The Small Price, $8, Makes Sales Easy

The Liberal Terms Make it Worth While

IRVIN W. MASTERS, Mfr., Dept. 3, MUNCIE, INDIANA

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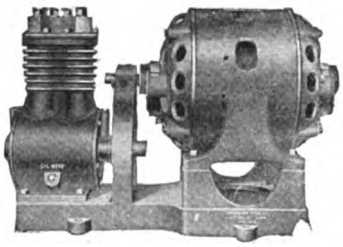


"The Garagemans O.K." is behind the Brunner Sign

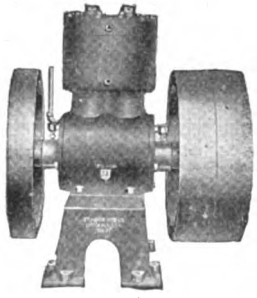
The Brunner Sign has been consistently demonstrating its wonderful advertising value to the garagemen for many years. Thousands of garagemen who have been rendering Brunner Service, and have been advertising the fact by displaying the Brunner Sign, know that the Brunner Sign is recognized by the Brunnerwise Motorist as a sure sign of a compressed air service that always satisfies.



INSTALL A BRUNNER AIR COMPRESSOR



Just now in these war times labor is scarce and labor-saving equipment is playing a big part in the economical administration of every business. A Brunner Automatic Air Compressor would save you many hours time each week, because it is a high class thoroughly dependable equipment that delivers the goods—it requires no attention whatever aside from an occasional oiling, and automatically maintains an adequate supply of compressed air continuously—no waiting—no complicated attachments to help motor carry the load - no restriction of the lubrication.



You Cannot Go Wrong with a Brunner Air Compressor

because every one sold is backed up with the guarantee of the manufacturer as well as the Brunner Jobber that it will do the work for which it is recommended, and that it will be found exactly as represented.



"The Motorist who is Brunnerwise knows Brunner Service Satisfies"



Write for No. 15 Catalogue and the Name of the Brunner Jobber Covering Your Territory—Get Acquainted with the Brunner Line

BRUNNER MANUFACTURING COMPANY

General Office and Plant:
UTICA, N. Y.

Cincinnati Branch:
CINCINNATI, OHIO

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"NORMA"

"NORMA" PRECISION BALL BEARINGS

(PATENTED)

Service—that's what the buyer of a car or truck pays for. Its value to him lies in the measure of the service it renders. And this service must be a thing inherent throughout the machine—not merely in body, chassis or engine, but in every minute detail entering into their construction and equipment.

No part of the equipment is more vital than the magneto and lighting generator. And no part of these accessories is more vital than their bearings. Wherefore—makers of high-grade, responsible magnetos and lighting generators have standardized on "NORMA" Precision Bearings.

Be Sure—See that Your Electrical Accessories are "NORMA" Equipped

THE NORMA COMPANY OF AMERICA

1790 BROADWAY NEW YORK

Ball, Roller, Thrust and Combination Bearings.

"NORMA"

Sell The Spring You Would Use On Your Own Car

Put yourself in the customer's place. — That will make more business for you, and eventually, for us.



PRACTICALLY UNBREAKABLE

THERE'S A HARVEY JOBBER NEAR YOU

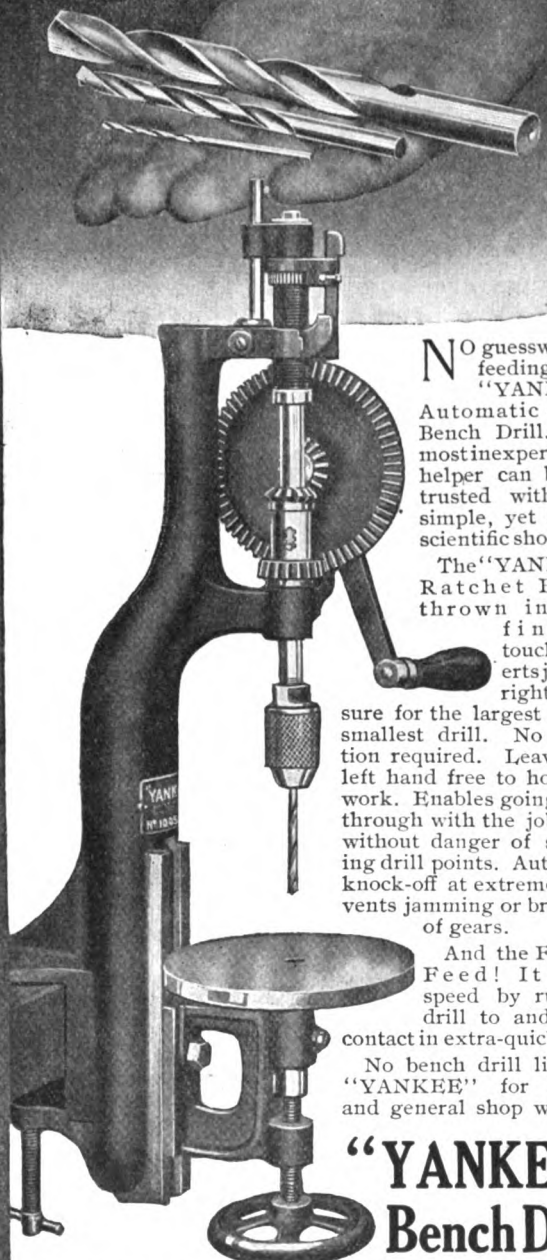
Our new catalogue giving Complete measurements of over 900 Styles of Springs is yours on request

HARVEY SPRING & FORGING CO.

921-17th Street RACINE, WIS.

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Automatic Feeding
For Large and Small Drills



NO guesswork in feeding your "YANKEE" Automatic-feed Bench Drill. The most inexperienced helper can be entrusted with this simple, yet highly scientific shop tool.

The "YANKEE" Ratchet Feed, thrown in at a finger-touch, exerts just the right pressure for the largest or the smallest drill. No attention required. Leaves the left hand free to hold the work. Enables going right through with the job—and without danger of smashing drill points. Automatic knock-off at extremes prevents jamming or breaking of gears.

And the Friction Feed! It adds speed by running drill to and from contact in extra-quick time.

No bench drill like the "YANKEE" for garage and general shop work!

"YANKEE" Bench Drill

No. 1005. Two speeds. 3-jaw chuck, holds drills up to ½ inch. Height 28 inches .... **Price** (Philadelphia) **$18.00**

No. 1003. One speed. 3-jaw chuck, holds drills up to ¼ inch. Height 18¾ inches .... **Price** (Philadelphia) **$10.75**

"YANKEE" Vise No. 990. For holding work on bench drills. Square finish—sets flat on sides, ends and bottom. Swivel jaw for taper work; groove for rounds.... **Price $2.35**

Your dealer can supply you

Write us for free "'YANKEE' Tool Book" of modern labor saving metal-drilling and -tapping, wood boring and screw-driving tools.

NORTH BROTHERS MFG. CO., Philadelphia

"YANKEE" TOOLS
Make Better Mechanics

The New Presto Necessity



Presto Body Brace and Running Board Support for Fords

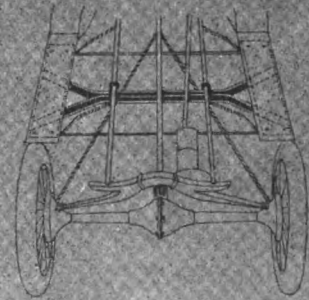
THE **Presto** Brace—strong as a bull because built scientifically like a trussed steel structure—read these ten important reasons why it is a real necessity for Ford Cars.

Stops vibration.
Avoids sagging of running boards and
Prevents their breaking away from fenders.
Prevents broken springs.
Prevents side swaying.
Prevents uneven strain.
Holds drive-shaft in position.
Holds all mechanical parts in alignment.
Equalizes spring action.
Easily installed; no holes to drill, no mechanic necessary.

Once used, it is practically indispensable because it enables you to carry 800 pounds on either running board if necessary without injury to your car. Dealers are amazed at the unprecedented success with which the Presto Brace is meeting.

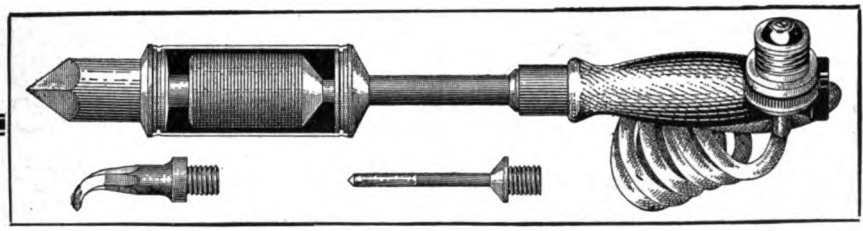
Price only $3.50 in U. S. A., except west of the Rockies, $4.00. In Canada, $6.00. Satisfaction guaranteed. Order from your jobber, or write direct to us, if he cannot supply you.

DEALERS—Here's a new one that's getting over big. Write and ask us about it. **Satisfactory discounts.** Write for literature and cuts of all new products. Presto products mean bigger profits through increased sales.



METAL SPECIALTIES MF'G. CO.
338-352 N. Kedzie Ave. Chicago
Eastern Branch—16-24 West 61st St. New York City.
Western Branch—149 New Montgomery St. San Francisco.

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GARAGE SPECIAL SOLDERING IRONS

ARE MADE WITH THE FAMOUS

"NO-BURN OUT" VEA HEATING ELEMENT

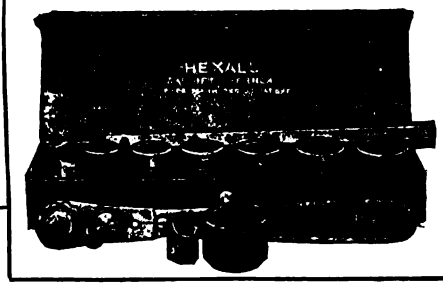
HEAT QUICKEST—RETAIN HEAT LONGEST

WRITE FOR DESCRIPTIVE CIRCULAR AND PRICE LIST

THE DOVER MANUFACTURING CO., DOVER, OHIO

30 Church St., New York, N. Y.—Branch Offices:—16 Ames St., Cambridge "A," Boston, Mass.

"HEXALL" No. 2



RATCHET SOCKET WRENCH

Set Complete Eleven Pieces
(Patented May 1st, 1917)

Send for Catalog
"BREAK ANY SEDGLEY WRENCH AND WE REPAIR IT—NO CHARGE."

When a Sedgley Wrench leaves your store, Mr. Dealer, you have the satisfaction of knowing there will be no "come back"—but the wrench you sold will "bring back" another customer—or two!

"Hexall" No. 2 contains—7 in. steel forged ratchet handle, two screw-driver bits, 7 in. extension bar, seven hexagon sockets. Packed in neat, strong cloth case.

R. F. SEDGLEY, MANUFACTURER, :: 2311 North 16th Street, Philadelphia, Pa.

Pacific Coast Representatives, McDONALD & LINFORTH, San Francisco, Cal.

20th CENTURY'S No. 6 SELF-VULCANIZING PATCH



This new idea in Patch construction eliminates every possibility of an imperfect tube repair—and the man who looks at an idea to see if he can use it, and not to see if he can get along without it, is the man who wins out every time.

This Patch is Guaranteed Not to Loosen, Leak, Creep or Blow Out. Absolute Satisfaction or Money Refunded

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2¼x16—36 Square Inches, 50 Cents 4x15—60 Square Inches, 75 Cents
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Seamless Steel Tubing

Over 3,000,000 Feet on Hand.

2000 SIZES. YOUR SIZE IS HERE

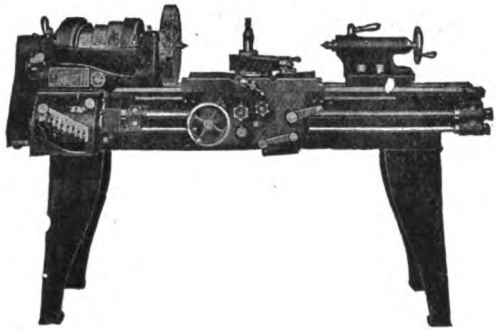
ALSO COLD DRAWN SEAMLESS TOOL STEEL TUBING

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14"x6' Monarch Lathe

Other Sizes, 16, 18, 20-Inch

Monarch Lathes are very accurate, rigidly constructed, modern in design and quick and easy to operate. They are recognized by the Automobile Repairmen as the best lathe for Garage use.

Monarch Lathes are low in price and within the reach of every garage owner. They are used in every class of work from the finest toolroom work to production work in the largest factories.

Furnished with taper attachment, milling, keyway cutting and gear cutting attachments, and other attachments useful in the Auto Repair Shop.

Send today for catalog No. 11 and prices

THE MONARCH MACHINE TOOL CO.
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Trade Mark Registered U. S. Patent Office

Keep Every Car Running

every day—relieve congested transportation facilities.

To keep the brakes safe, to avoid accidents and delays, use

S-M-C
ASBESTOS BRAKE LINING

These letters S-M-C on a roll of brake lining mean **S**afety **M**ade **C**ertain—because every roll that bears them is closely woven of finest asbestos, with friction wire interwoven; then compressed to exact size by massive steel rollers after being treated with the **S-M-C** Special Compound, which resists heat, water, oil or gasoline.

MADE IN ALL WIDTHS UP TO 6 INCHES

Dealers, Write for Quantity Prices

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5541 Lena Street Philadelphia, Pa.

The Modern Factory—Equipped to Make All Types of Brake Lining and All Widths Up to 6 Inches

Have You Had Trouble With Your Tires?

The fault is not with the tires. You, or your chauffeur, or both, are to blame. The responsibility is yours because you should keep the tires pumped up to a specified pressure, and don't.

Tires that are kept up to the proper air pressure last twice as long—sometimes ten times longer—than tires that are run with not enough air in them. Measure your air daily with a

SCHRADER UNIVERSAL TIRE PRESSURE GAUGE

and get out of your tires all the miles they can give.

Price in U. S. A. **$1.25**

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Leave Your Tube in the Vulcanizer
AND WAIT ON YOUR CUSTOMERS
Why Not?

AMERICAN AKRON

Famous Five-Minute Cure Cement

WILL CURE IN FIVE MINUTES

Will Not Overcure, If Left in the Heat for One Hour

Put Up in Seven Size Containers
Made in Two Grades—Red and Gray
Recommended for Both Casing and Tube Repairs

IF YOUR VULCANIZER IS YOUR BOSS, DECLARE YOUR INDEPENDENCE TODAY

Write for Prices

The American Rubber & Tire Co.
AKRON, - - - - OHIO.

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Saves Time and Keeps the car Fine

That's the verdict of the man who uses NON-FLUID OIL on the gears and bearings of the car he is looking after.

TRADE MARK REGISTERED IN
NON-FLUID OIL
UNITED STATES PATENT OFFICE

saves time because it lasts longer than common grease. It is all lubricant and contains no non-lubricating substance like ordinary grease.

NON-FLUID OIL won't melt with heat nor harden when the car is not running.

NON-FLUID OIL just lubricates all the time, keeping the gears and bearings running smoothly and with the minimum wear and tear.

Try it yourself—most dealers keep it.

Get "KOO special" grade for gears, "KOOO" for bearings.

New York & New Jersey Lubricant Co.
165 Broadway New York

Guaranteed for 10,000 Miles



EVERY Brictson Tire is sold under a specific 10,000 mile written service guarantee. This guarantee is the longest and strongest ever put behind a pneumatic tire and is a positive protection to every purchaser.

"Absolutely Puncture Proof"

Brictson Tires are puncture proof, and proof against blowouts, skidding, rut wear, rim cuts, and can't be damaged by oil or gasoline. Wonderful resiliency, easy riding qualities as well as economy commend them to every car owner.

The Big One-fourth Retread Feature

Should the tread surface wear out after 10,000 miles of service you can get a new retread for one-fourth the original cost of the tire, instead of buying a new tire, and you keep the remaining three-fourths in your pocket. With ordinary service the Brictson Tire should run enough beyond the 10,000 miles to require one or two extra retreads. The more retreads you use the cheaper your service.

FREE TRIAL OFFER

To convince you the Brictson Tire will give satisfaction TRY THEM ON YOUR CAR AT OUR EXPENSE. Write today for this Free Trial Offer, a copy of our guarantee and full information about Brictson Tires.

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Dept 178
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OMAHA, NEBRASKA

Brictson Pneumatic Tires

REX
Automobile Jack
FOR
Garage and Private Service

ENGINEERED TO PERFECTION

High powered, quick in action and made to last regardless of hard usage.

BECAUSE

Constructed entirely from high grade Heat Treated Steel and Malleable.

It rolls on four good strong wheels and a mere boy can lift any car.

BECAUSE

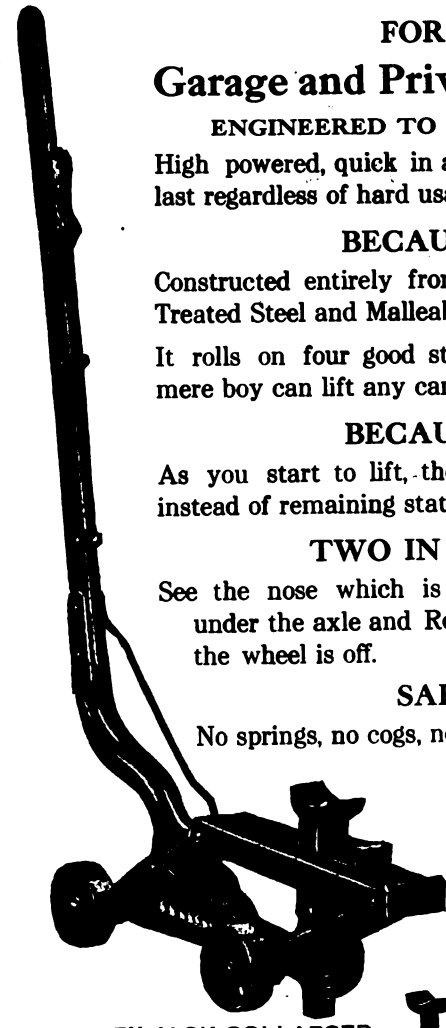
As you start to lift, the REX rolls under instead of remaining stationary.

TWO IN ONE

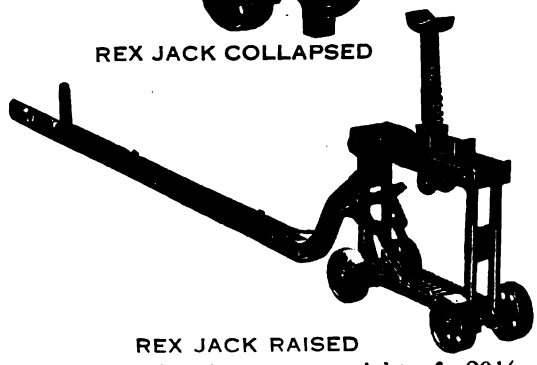
See the nose which is put there to hook under the axle and Rex Jack it up when the wheel is off.

SAFE

No springs, no cogs, no ratchets, but automatically locks at any height thus insuring safety at allheights.



REX JACK COLLAPSED



REX JACK RAISED

Glides under the lowest part of any car even though they be equipped with bumpers or extra tires and raises to a neight of 20½ inches without blocking.

FRIENDS

Thousands in use and not a single complaint but hundreds of compliments.

As a time saver it has no equal and will pay for itself any busy week. Ask any user.

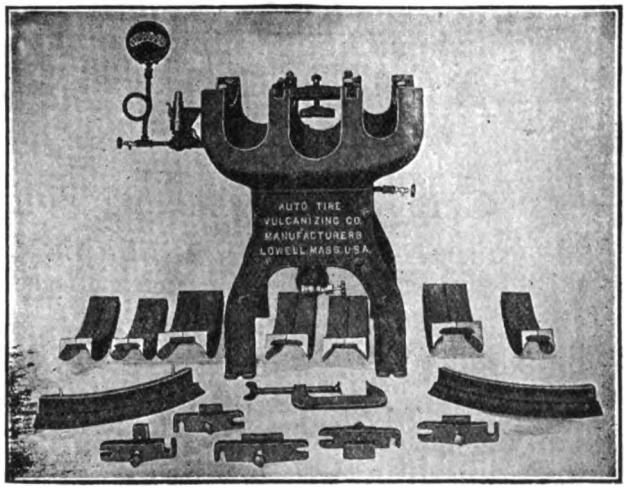
Stocked by your accessory jobber.

WEIGHT 47 LBS. **LIST PRICE $20.00**

Some Day you will Buy this Time Saver

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Exceptionally Large Profits can be made by Repair and Garage Men with

No. 8 Lowell Adjustable Sectional Vulcanizer

It's different, superior, economical in operation, in fact beyond comparison.

Complete and thorough work can be accomplished with this vulcanizer at all times.

DON'T LOSE A MINUTE—WRITE TODAY!

Auto-Tire Vulcanizing Company,
140 Powell Street - - - Lowell, Mass.

"WHITNEY"

COTTER TYPE

TRANSMISSION CHAIN

For Motor Trucks and Tractors

No other Detachable Type Approaches the "Whitney" in Popularity.



Our years of experience in chain making, our selection of only the best materials, our special processes of manufacture, and our rigid system of inspection, all combine to make "Whitney" chains the leaders in their line.

Convenience	**Accuracy**
Durability	**Economy**
Strength	**Reputation**

THE WHITNEY MFG. CO., Hartford, Conn.
Chains Keys and Cutters Hand Milling Machines



Looks Like a New Top

Give the old top a few minutes attention. Brighten it with

"F-S" "Evernew" Auto-Top Dressing

It brushes on easily and dries quickly. It is waterproof and pliable.

Write for prices

FELTON, SIBLEY & CO., Inc.
Mfrs. of Colors, Paints, Varnishes since 1863
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"Evernew" Auto-Body Enamel in eight standard colors. Special shades to order. (18-5)

END THE TROUBLE NOW

BY INSTALLING

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—IN—

FORD AND CHEVROLET 490 FRONT WHEELS

$10.00 Per Set of Four Bearings

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LIQUO-SEAL
A WONDERFUL CEMENT FOR LEAKY RADIATORS



LIQUO-SEAL not only finds leaks in radiators and fixes them, but prevents rust and scale from forming.

A small quantity is poured into the radiator and upon contact with the air it forms into cement, *immediately stopping the leak.*

Contains nothing to injure or clog up cooling system in finest honey-comb radiators.

Will automatically stop any new leaks from forming.

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LARGE CAR SIZE, EACH, 1.50

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HARTFORD, CONN.

Our 1918 Catalog and Latest Price List showing 47 Different Chemical Specialties, is now ready for distribution.

Electrotypes for catalogs furnished upon request.



EASIEST TO SELL!

Because it is the most efficient in service, the most durable and the most powerful. That describes the

BUELL EXPLOSION WHISTLE

Thirty-one manufacturers specify it as standard or optional equipment including such cars as Lamson, Little Giant, Pierce-Arrow, Mack, Diamond T, Columbia, White, etc.

Motorists everywhere are buying the Buell. It will pay you to get particulars at once.

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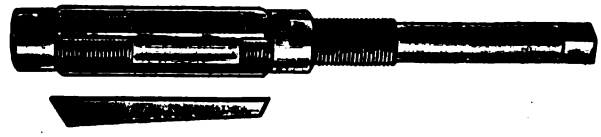
BUELL EXPLOSION WHISTLE

The best made for repair work

The Critchley Expanding Reamer

Reg. U. S. Patent Office

Try One and You Will Want More.



Reams odd size holes

Send for Circular

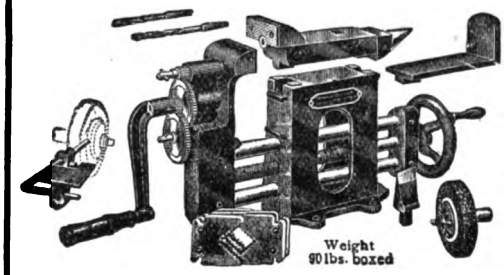
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ONLY PHILADELPHIA HOTEL
Having Direct Subway and Elevated Connection with All Railroad Stations, Ferries and Department Stores.

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Cor. 11th & Market Streets
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Better Than Ever
Thoroughly Modernized
Remodeled and Equipped
NEW MANAGEMENT
ROOF GARDEN
In connection
Special Club Breakfasts
and Luncheons
Rates—Without Bath, $1.50
With Bath, $2.00 and up.
FRANK KIMBLE, *Mgr.*



$25 worth of tools $14

It's a Complete, Convenient Repair Outfit—All in Itself

Bought separately, the tools in this set would cost you $25 or more. You wouldn't be sure of getting as good tools either and you wouldn't have anything like as time-saving an outfit as you get in the

STEWART HANDY WORKER

A wonderful combination of tools (six in one). Outfit includes strong practical anvil; powerful vise up to 4¼ inches; a sure-grip steel pipe vise; corundum grinding wheel, 5 inches by 1 inch; a two-speed drill press with 2 drills; a metal cutting wedge and driving mechanism of three speeds—direct, 4 to 1 and 16 to 1—easily regulated by changing handle grip. It operates grinding wheel, buffing wheel and many other similar tools. All for **$14.**

EVERY PRIVATE GARAGE SHOULD HAVE ONE
EVERY PUBLIC GARAGE NEEDS AT *LEAST* ONE

Send $2 with order for one of these outfits, pay balance on arrival. If not satisfactory in every way, return it and money will be refunded.

Descriptive Booklet Mailed on Request

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BLACK & DECKER

LECTROFLATER

ELECTRIC AIR COMPRESSORS

GIVE CLEAN PURE AIR QUICKLY!

RAIN OR SHINE—IN THE GARAGE,
ON THE CURB—IN THE STREET—ANYWHERE

The Lectroflator can be filled by simply attaching the electric cord connection (4) to a convenient electric light socket.

Automatic Pressure Switch (2) starts the compressor refilling the tank when the pressure drops to 130 pounds and cuts out when 150 pounds pressure is reached. The large accurate gauge (5) indicates the tank pressure at all times.

The Lectroflater is always ready with a load to fill ten average tires at a cost of 1/10 of a cent each in current.

The Pump itself is lubricated with grease—not oil (1) which means there's no oil level to maintain, and it's air cooled by forced draught so there's no liquid to freeze or evaporate.

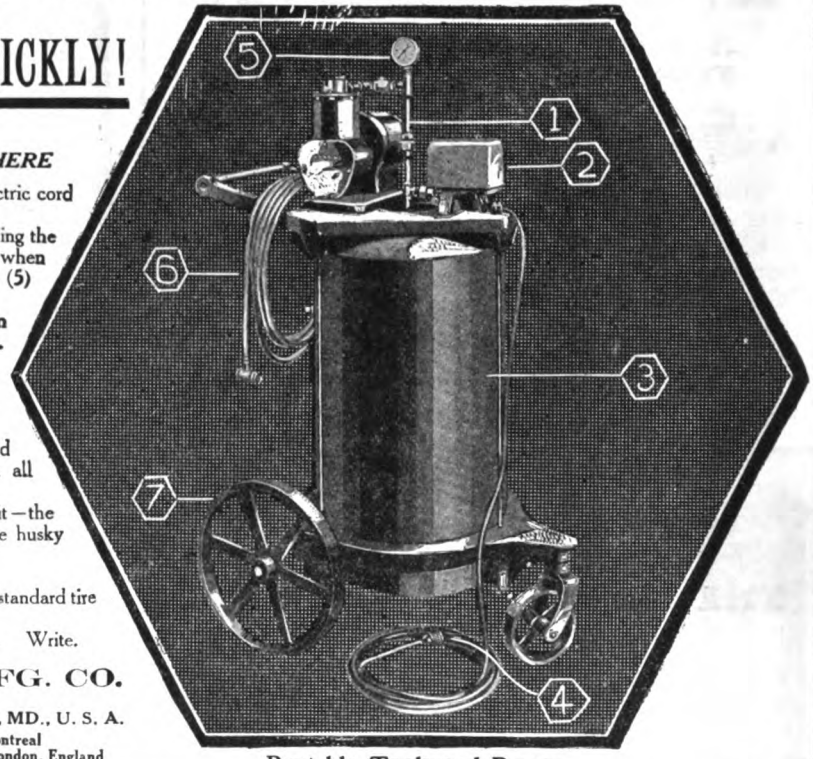
All working parts housed and protected against dirt, grit, and rough handling. The tank (3) is welded and brazed in all seams and is tested to 300 pounds hydraulic pressure.

It's handsome—this Lectroflater Pump and Tank Outfit—the finish is green and black enamel with nickel trimmings. Large husky metal wheels (7) are furnished for hard service.

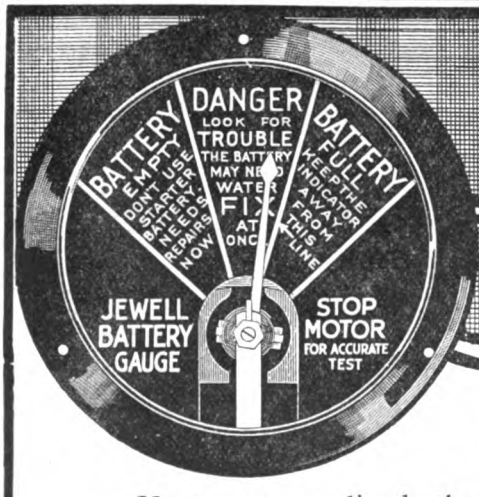
Twenty-five feet of high pressure hose (6) fitted with standard tire chuck—goes with each outfit.

Catalogue, electrotypes and mailing literature available. Write.

THE BLACK & DECKER MFG. CO.
Makers of B & D Portable Electric Drills
SOUTH CALVERT STREET, BALTIMORE, MD., U. S. A.
Distributors in Canada: Northern Electric Company, Ltd., Montreal
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Portable Tank and Pump



Jewell BATTERY GAUGE

Mr. Dealer, Are You Getting Yours?

Have you realized that the JEWELL Battery Gauge is the most valuable and the best selling accessory ever put on a car?

It saves the car owner Time, Trouble, Money and Inconvenience by telling him accurately and constantly the condition of his battery and warns against any approaching trouble in time to prevent the actual occurrence.

It eliminates the disagreeable hydrometer tests and their attendant disaster to person, clothing and car.

Installed by anyone in half an hour and is approved by battery manufacturers and service stations.

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THE JEWELL ELECTRICAL INSTRUMENT CO.
1646 W. Walnut Street, Chicago

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GRAY-HEATH COMPANY
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THE Fisher PATENTED "RIM-GRIP" SUB-CASING

MORE MILES PER TIRE
LESS TIRES TO BUY

THE BLOWS THAT YOUR TIRES RECEIVE, WHEN YOU STRIKE OBJECTS IN THE ROAD, LEAVE WEAKENED PLACES IN THE FABRIC.

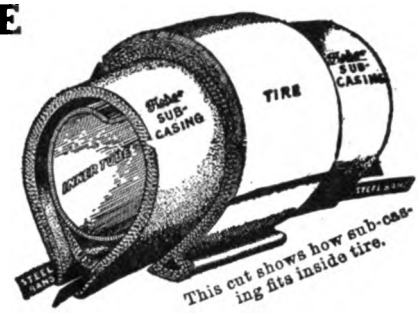
A TIRE IS AS STRONG AS ITS WEAKEST PLACE

These weakened places are hard to detect now, but will result in blow-outs later.

RIM-GRIP SUB-CASINGS reinforce the fabric of the tire at all points from bead to bead. They make a partially worn tire stronger than it ever was. It can be worn out completely and the sub-casing used in another tire. As the cost of equipping a car with new tires is much greater than last year, it will pay you to investigate Rim-Grip Sub-Casings. *Write for particulars.*

FISHER MANUFACTURING CO.

1706 PAYNE AVENUE, :: :: CLEVELAND, OHIO



This cut shows how sub-casing fits inside tire.

NATIONAL PRESTIGE

of National Rubber Tire Filler was won through exceptional performance in forever eliminating the bugaboo of auto pleasure—punctures and blowouts.

Made of Pure Rubber, cut in small particles, treated, moulded and vulcanized by our special steam process. Fits all the different size casings. No inner tube and air used, eliminating the cause of all tire trouble. Stops the expense of buying, repairing and replacing the inner tubes. Doubles the life of the casing—reducing the cost one-half. Can be transferred and re-transferred as often as is necessary. Has been sold throughout the U. S. and many of the Foreign countries for six years. Has years of actual service record back of it. It has all the easy riding qualities of the air-filled tire, with none of its faults and uncertainties. No waiting to use your car; it is always ready whenever you need it. Let us send you small sample and tell you more about it.



NATIONAL RUBBER FILLER CO.

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"MOTOR CAR VARNISHES"

A book useful to painters, finishers, garage, car and carriage owners, and to farmers who refinish their cars. Free upon request.

MURPHY VARNISH COMPANY

NEWARK CHICAGO

Easyon Chains

"Grip Like a Mud Hook-Ride Like a Bare Tire"

WOODWORTH MFG. CORP., - Niagara Falls, N. Y.

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Are Doing Their Bit

Enable Your Car to Meet War Time Requirements of Economy and Fuel Conservation.

Some of the things that PECK'S Super Heat Manifolds are guaranteed to do:



Type for Fords $9.00

West of Rocky Mountains, $10.00

If your car is not equipped with a PECK'S Super Heat Manifold, order one today. It is guaranteed to give you from 40 to 60% more miles per gallon, with the same efficiency that could be obtained with high-test gasoline.

Cut fuel costs; increase mileage; eliminate carbon; give more flexibility, greater power; stop over-heat of motor; prevent fouled spark plugs; save trouble and satisfy owners.

With the increased cost of gasoline and with the poor quality, it is necessary to use some means that will vaporize the fuel, so the highest efficiency may be obtained. PECK'S Super Heat is the way.

If Your Dealer Can Not Furnish You, Write to Us Direct.

Dealers and Jobbers Wanted. Liberal Commissions. Write.

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Eastern Representatives: N. A. PETRY CO., Inc., 1307 Race Street, Philadelphia, Pa.

WHY USE SHELLAC?



When You Can Obtain Far Better Results With

Permatex Gasket Cement

Produces a pressure-tight union that is gasoline, kerosene, oil and water proof and has a heat resistance five times that of shellac.

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2-oz. Swab Bottles, 20c each ¼-pt. Cans, 30c each 1-pt. Cans, 90c each
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START A TIRE REPAIR BUSINESS

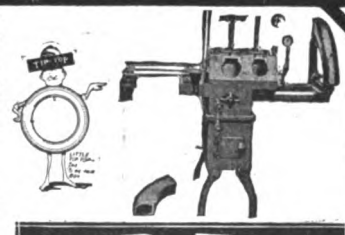
MAKE GOOD MONEY WITH THIS GREAT OUTFIT

Big capacity vulcanizer with self-contained steam boiler—a complete tire repair plant that will make both outer casing and inner tube repairs on practically all makes and sizes of tires on the market.

New Type-F Equipment

We make a complete line at all prices. Write today for booklet, "Tire Repairing, the Business of the Times."

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Pacific Coast Distributors—Geo. W. Eno Rubber Co., 280 Golden Gate Ave., San Francisco; 1026 So. Los Angeles St., Los Angeles.



TIP-TOP OF AKRON TI-RE-PAIR OUTFIT

BRAENDER TIRES

UNDER THE HARDEST SERVICE for the past 6 years Braender Tires have continued to deliver Service thoroughly satisfactory to Owner and Dealer alike.

Our Dealer Proposition has built and is building permanent business and increasing profits for progressive dealers all over the country.

Write at once for particulars, either to home office or any branch

Single cured. Wrapped tread. Bull Dog Grip. Non-Skid and Plain Casings. Red and Gray Inner Tubes.



Braender Rubber & Tire Co.

Factory: Rutherford, N. J.

"The Tyre To Tie To"

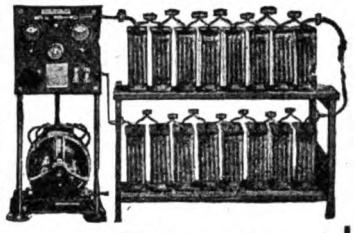
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Get your share of this business by selling a better plant at a more favorable price. And now is the time—while the farmer is so prosperous.



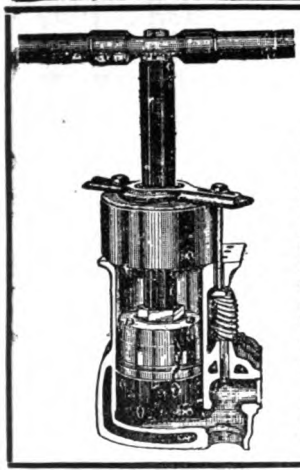
Type F Mayhew-Electric

is the last word in Belted Type Lighting Plants and can be sold to every farmer who has a gasoline engine or can afford to buy one.

Requires a minimum of attention. Batteries guaranteed for five years A better generator and high quality switchboard with electric starter.

Our prices will astonish you. Write for our exceptional agency proposition.

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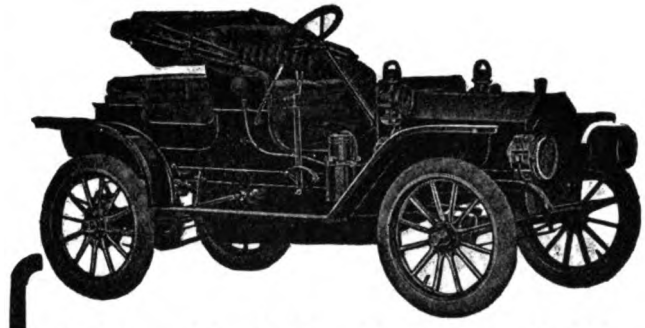
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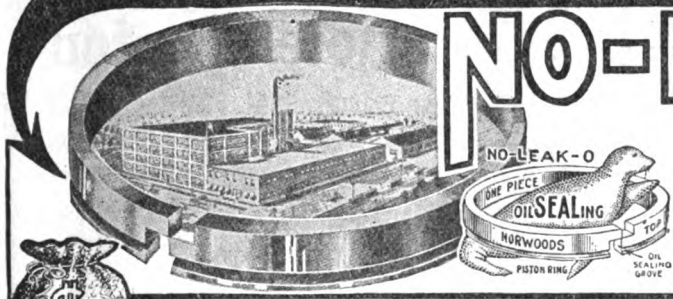
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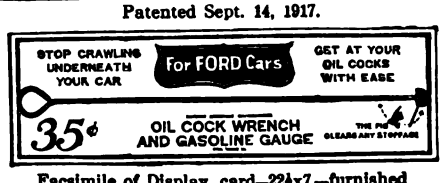
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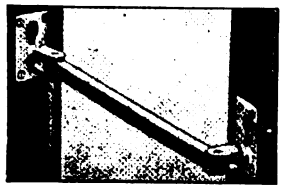
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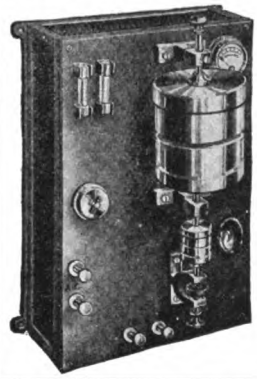


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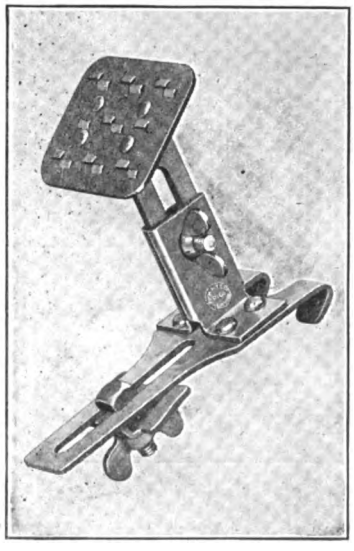
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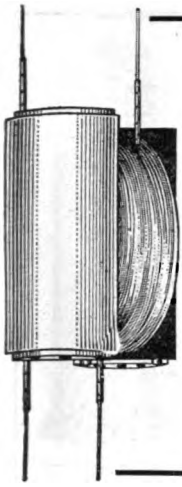
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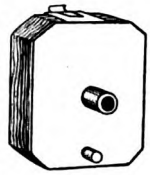
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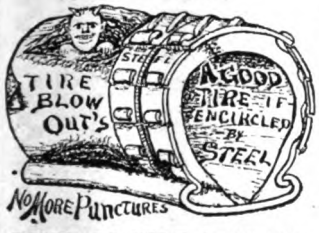
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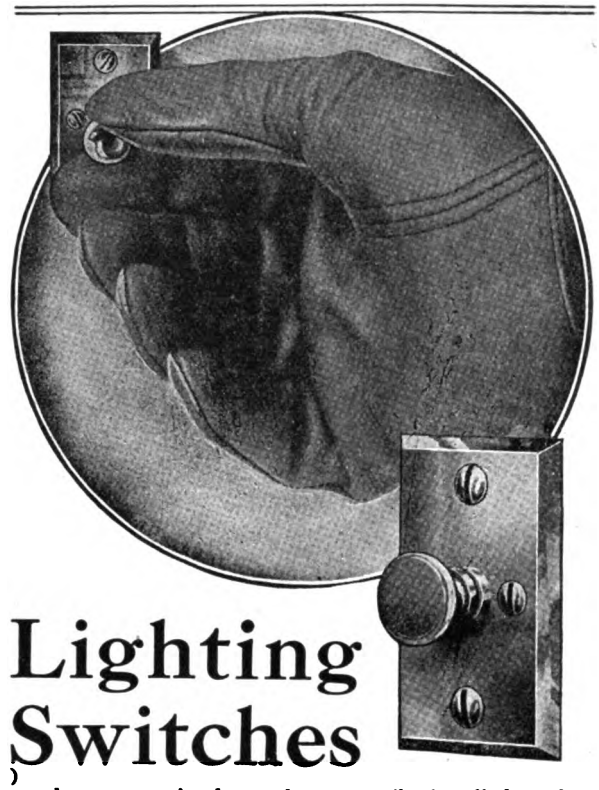
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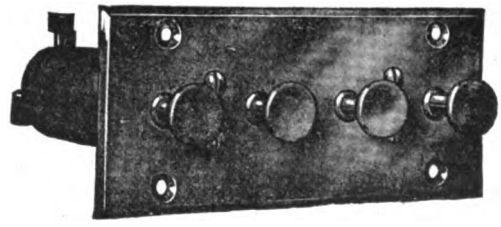
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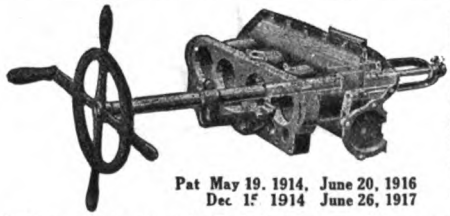


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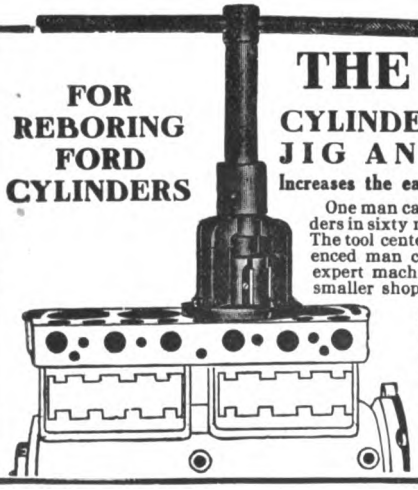
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B	1¼	½	12	3½
C	1½	¾	12	5
D	1¾	¾	12	7
E	2	1	12	8½
F	2¼	1¼	12	10
G	2½	1½	12	11½
H	2¾	1¾	12	12¾
I	3	2	12	13¾
J	3¼	2¼	12	15½
K	3½	2½	12	17
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It is often possible to run over bruised threads without removing the part from the car. In close quarters, too cramped for the regular die stock, the Bit Brace Die Holder may be used—(the illustration shows a repairman cleaning up the thread on a spring shackle bolt).

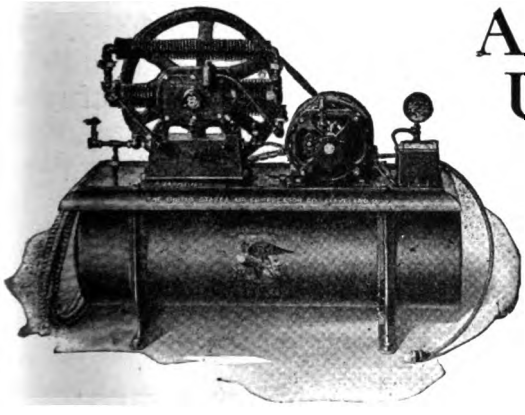
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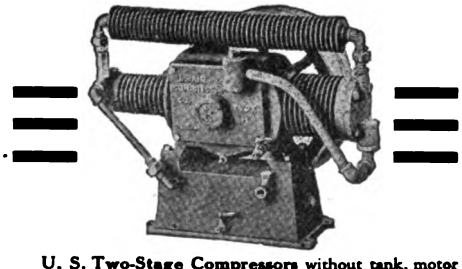
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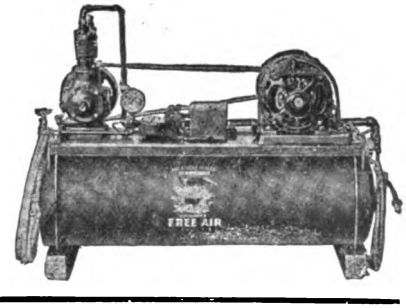


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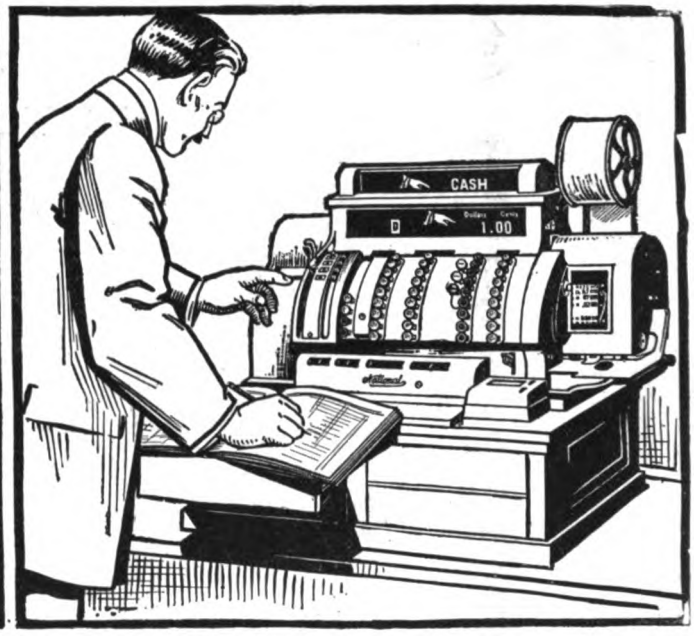
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The Car Hospital and the Surgeon

The First of Three Articles, Dealing With Sick Cars Garage-Hospital Equipment and Ambulance Construction

I REALLY believe that Mr. Butterworth's old automobile has got dyspepsia, and I would be sure of it if dyspepsia was catching, for if I ever saw an automobile with stomach trouble, it surely is that machine."

I happened to overhear this statement made by a certain garage man not long ago, and it was his statement that brought to my mind the comparison between automobiles and human beings. An automobile surely acts human at times. It seems to have its own special likes and dislikes, its eccentricities, and is affected by the weather. Though it cannot choose its own master, it can protest, and often does, against hard work, by ceasing to work entirely. It acts similar to many people that we meet, by lying down on the job, or tries not to over-exert itself.

My First Automobile.

I once owned an automobile of the tin pan variety, which I will swear had a brain of its own. I could start the engine without the least bit of trouble at times, while someone else might figuratively "crank their heads off" without getting a single sputter from the engine. The engine seemed to know when I was in the machine and seemed to try its best to please; but if I left it in charge of someone else for half an hour, I always found it within a few feet of where I had left it, when I returned. The machine was absolutely thief-proof and though I disposed of it to an unsuspecting purchaser, the introduction never seemed to satisfy the automobile, though I am sure I did it properly.

The mechanical construction is very similar to the physical make-up of man. Its skeleton is its frame, its wheels are its feet, and its gears are its muscles. It may develop indigestion in its carburetor from trying to digest heavy gasoline; it may become frost-bitten and crack its water jacket; it may fracture its connecting rod or be overcome by the heat in the summer months.

Should anything go wrong with our internal machinery we are carried to the hospital. If trouble develops in the automobile, it takes a trip to the hospital as well, only in this case we term the hospital "the garage."

The repairman might be likened to a surgeon and in order to do good work the repairman must have proper tools just as the surgeon must have the best of instruments.

To a certain extent a mechanic may be said to be no better than his tools. He cannot do good work with poor tools, any more than the surgeon can perform a successful operation by the use of improper or inferior instruments. No matter how large or how small the garage may be, there are certain tools and equipment which are indispensable. Even the car owner himself in a good many instances practices automobile surgery and should have his own little hospital equipped with its operating table, which he calls his work bench, and other necessary tools for performing the various operations.

Proper Light Necessary.

Perhaps the most important thing to be considered in a car hospital is the lighting arrangement. No mechanic, however adept he may be in the art of performing an engine operation, can do satisfactory work unless he can see the parts upon which he is operating. A garage should have as many windows in the sides as possible. Even the doors should be fitted with large glass panels and if possible, a skylight should be fitted into the roof. In addition to this there should be a number of drop lights furnished, all distributed around the garage in such

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a way that the mechanic need not spend time in finding an extension light and connecting it with a wall receptacle.

Some time ago I was in a garage where the repairman was working on his back underneath an automobile. If I remember rightly, he was scraping in connecting rod bearings and he would lift the drop light frequently to examine the bearings. About every five minutes he would crawl out from beneath the car and take up a broken portion of the wiring that was dragging on the floor.

Occasionally, he would burn out a fuse, all because the insulation on the wire had been destroyed by contact with metallic pieces and with oil, from dragging on the floor. I figure that the time the mechanic spent in repairing the lighting system was greater than the time consumed in making the engine repair. Quite frequently he would receive a severe shock from the light socket which was not conducive to steady nerves and good work.

A Handy Drop Light System.

At my suggestion a drop light was installed similar to those shown in Figure 1. The drop light A was connected through a flexible cord with the wall socket D and to A was attached a long heavy cord which was passed through two blocks, as shown at C and attached to a weight B. A knot was tied in the cord E to prevent the light A from being drawn out of reach by the weight. When the mechanic desired light on his work he simply pulled down one of the lights, and as soon as he was through with the light, he released it. The flexible cord was immediately drawn away from the floor and away from contact with oil and grease.

The lights might be arranged on the sides and across

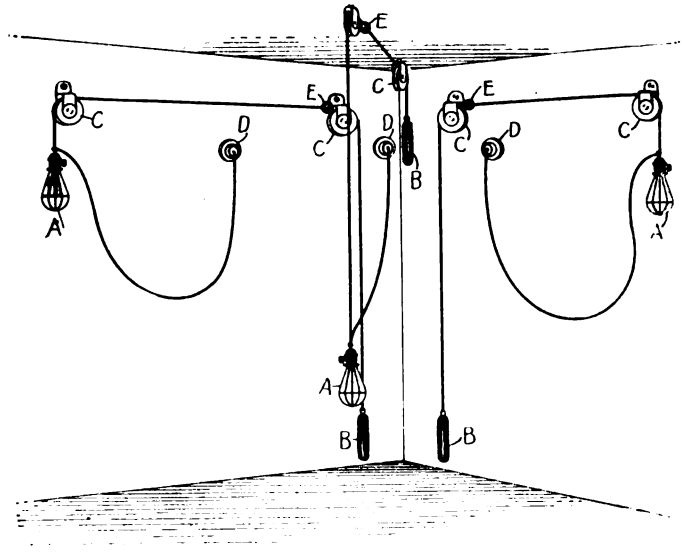


Fig. 1—Suggested Arrangement of Lights in the "Hospital".

the ceiling as shown in our first figure. In all cases, however, the weights must be carried to the side of the room or preferably to a corner where they may be enclosed in a box.

Few garages are built with pits in the floor. In many cases the city or state fire laws prevent such an arrangement, and there are few repairmen that care to do work while in the pit. The mechanic may crawl beneath the car and lie in the oil and grease upon the floor. If, however, he is enterprising he will not care to do this,

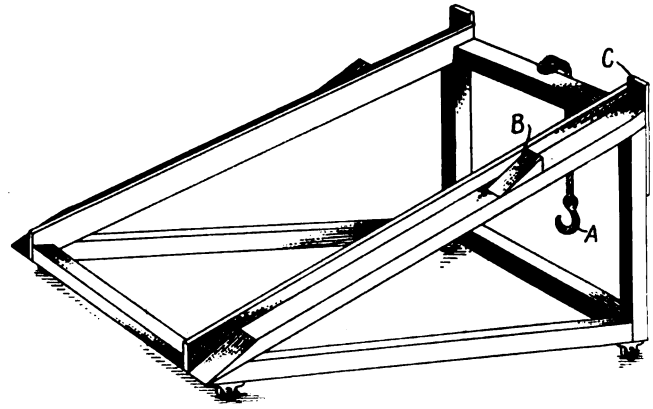


Fig. 2—How the Portable "Pit" May Be Constructed.

for he realizes that he cannot do good work lying on his back with his eyes only a few inches away from the work.

A Portable Pit.

There are two ways to overcome this trouble, and in Figure 2, a suggestion is given which should prove interesting both to the large garage owner as well as to the private car owner. This device can be made of odd pieces of lumber, preferably heavy joists, which may be obtained at almost any lumber yard. The illustration shows just how the device should be built. The inclined runways should each have an adjustable wedge, B, bolted into place and so arranged that it may be placed at a number of different points. The sides of the runways should be protected with boards to obviate any danger of the car wheels running over the sides. Stops should be provided at C to prevent the car from running over the end.

If work is to be done upon the front end of the car the device is pushed against a wall and the car run up the plane and fastened into place with the iron hook A. As an added protection, the blocks B are put into place to prevent the car from rolling backward. The car with the device in place may be wheeled to any position in the garage, for the runway is provided with casters upon the bottom. The mechanic can crawl beneath the car much more easily with it up in the air and do his work much better than if the car rested upon its own wheels.

An Automobile Cradle.

Another form of hoist which should be built for every large garage is shown in Figure 3. Four by four joists should be used throughout, and these joists should be reinforced at the corners by means of angle irons. Across the center at C a joist should be arranged and fitted with numerous large eyebolts.

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Two sets of block and tackles are used for lifting the whole car from the floor and a heavy clamp should be provided at B around which to wind the end of the rope from the tackle. A car may be suspended in this cradle-like arrangement and an additional tackle hung upon the joist C for lifting out the engine or removing the transmission. As in the device shown in Figure 2, casters are provided so that the whole arrangement may be moved to any part of the garage even after the car wheels have been taken from their places.

An Engine Operating Table.

In Figure 4 is shown what might be termed an "operating table," and though there are many of these devices now on the market, the garage man can construct one for himself very easily from pipe fittings, angle iron and cold-rolled steel shafts.

Two large A frames are made from angle iron and reinforced across the bottom with a strip of flat iron. Upon the upper parts of these A frames are two large plates with holes cut through them large enough to carry

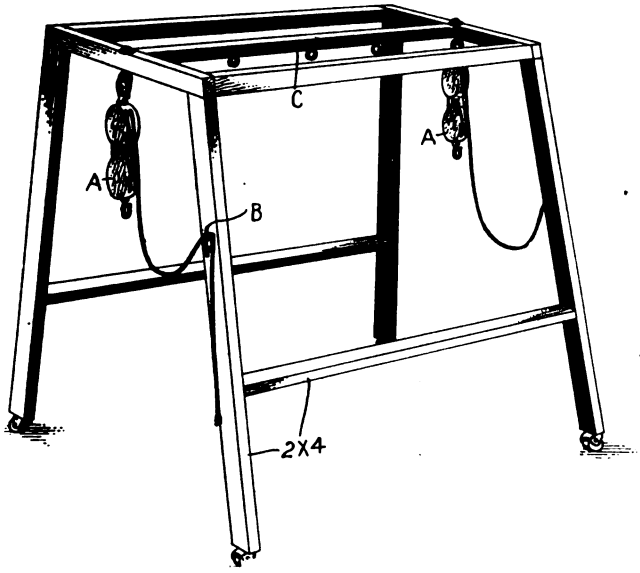


Fig. 3—An Automobile Cradle, Which Should Be Found in Every Garage.

two inch hydraulic piping. Around these holes should be punched a number of smaller holes to accommodate bolts. Upon one end of a short piece of hydraulic piping is welded or pinned a floor plate D, and this floor plate is bolted to a piece of channel or angle iron as shown at C.

The hydraulic piping should be threaded its full length and provided with two more floor plates. The purpose of these floor plates is to clamp the piping in place upon the A frames, and if the holes in the A frame are properly bored, the frame shown at C may be tipped at practically any angle.

Two more pieces of flat iron are provided as shown at E and both C and E are punched with holes evenly spaced their entire length. Upon this frame an engine may be placed bolted to the cross pieces E and tipped at any angle for repairs. At a slight additional expense casters may be mounted upon the legs and the motor operating table may be wheeled into the machine shop or to the work bench. I want to lay special stress upon this piece of equipment for a garage, as I feel that it saves considerable time.

Device Saves Much Time.

I visited a supposedly up-to-date repair shop in New England where the owner did not care to invest in a motor operating table such as I have mentioned. I watched one of the mechanics remove an engine from the car, and this is about what happened:

The mechanic loosened all of the bolts in the engine and called two other mechanics from their work-bench to help him. The three men, after much talking and arguing, lifted the engine from its place and carried it to the work-bench where the first mechanic did a little work upon it. He then decided that the whole machine would have to go to the machine shop for repairs, and so he called the two mechanics to help him again. After considerable more trouble they managed to get the engine into the machine shop where two of them remained to hold it beneath an upright drill. The third did the work.

For this one repair, three mechanics were kept busy approximately half an hour each. I didn't stay to watch them put the machine back into the automobile again, but I should judge another half hour might have been consumed in this performance. Three hours of wasted effort per day in overhauling one engine might have been the item charged against this particular repair. It would have been a needless expense had the garage been provided with the device which we have mentioned above.

What a needless waste of time there is in locating small tools! A mechanic crawls beneath a car and discovers that he lacks a hammer. Out he crawls again, goes to the work-bench, hunts around and finds that implement, then crawls beneath the car again.

If he does not find the hammer upon the work-bench,

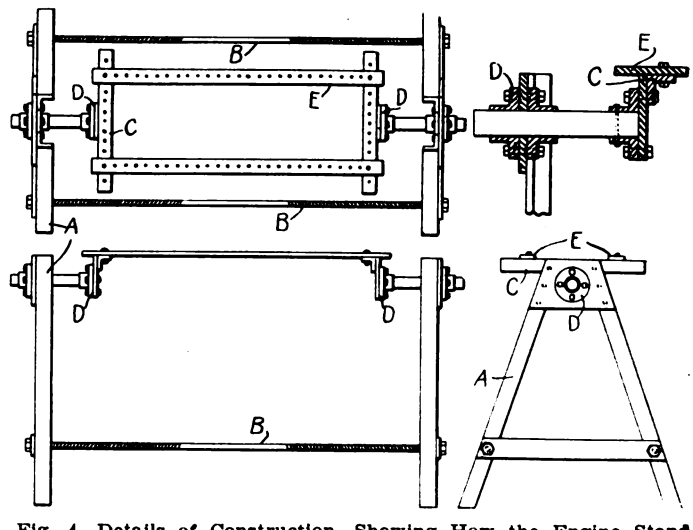


Fig. 4—Details of Construction, Showing How the Engine Stand Is Made.

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it is very possible that he borrows the tool from the mechanic working under the car next to him. In a few minutes that mechanic misses the hammer and he goes through the same performance, and so it goes. Every day each wastes a dollar's worth of time hunting around for a forty-five cent hammer.

Again, small tools have the extremely bad habit of disappearing. They seem to be equipped with the necessary limbs for their own locomotion, so quickly do they get out of reach. If they are thrown indiscriminately into a general box of tools, their absence is never noticed until they are wanted.

If one arranges repair tools in a box as shown in Figure 5 he will have no trouble in locating them, for the very reason that there is a place for each particular tool, and its absence may be noted as soon as a particular job is completed. The boxes may be made in varying depths, and each one should be made to fit a particular set of tools. One box may hold hammers, chisels, pipe wrenches, pliers, etc., and marked on the outside "general tools."

Another may be fitted to contain tire and valve grinding tools, another woodworking tools, and still another Ford and other special wrenches. After the tools have been selected for a particular box, the box should be made to fit them. Each tool should be put in place and staples driven upon each side of it. Through these staples a length of heavy cord should be passed and the cord fastened to an ordinary flagpole rope fastener. If the tools are longer, two or more ropes may be used

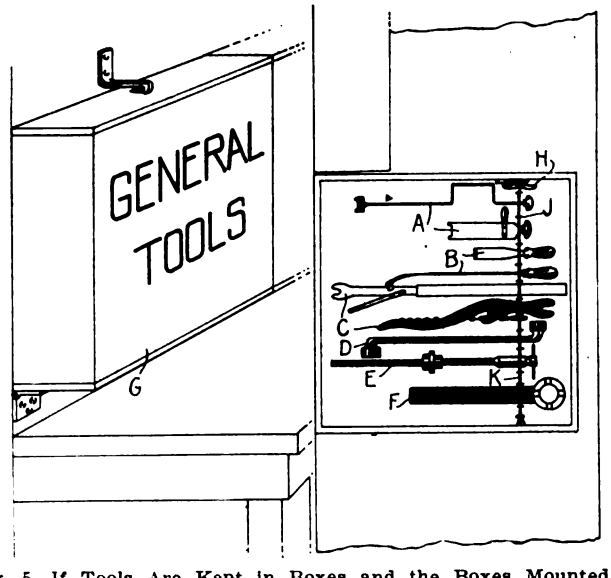


Fig. 5—If Tools Are Kept in Boxes and the Boxes Mounted as Shown, Much Time May Be Saved.

to hold them in place. The above box shown in Figure 5 contains valve tools and special valve wrenches.

In mounting these boxes on the wall above the bench be sure to have the hinges high enough from the bench so that the box can be opened flat upon the top of the table.

Wall space in a garage should be utilized as much as possible. Many of the heavier tools may be mounted upon the walls rather than thrown beneath the benches.

A Washing Tank.

In Figure 6 is shown the unique washing vat combination. The vat is made in two sections of heavy gal-

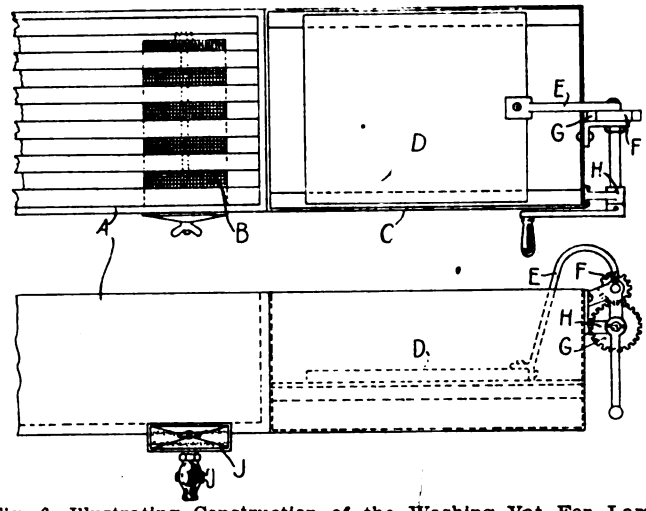


Fig. 6—Illustrating Construction of the Washing Vat For Large and Small Parts.

vanized iron and lined throughout with wood of at least half an inch in thickness. For the heavier pieces, the vat shown upon the left is used. Across the bottom of this vat extending lengthwise are a number of slats, and near the partition, the bottom is cut and a large box-like arrangement soldered beneath it. The front of this box-like arrangement is fitted with a cover held in place by a long bolt, as shown by the dotted lines, and a wing nut. Inside the box is placed a square screen of fairly fine mesh. The purpose of this screen is to prevent dirt from clogging the drain cock at the bottom.

The compartment shown at the right is fitted with two wooden runners in each side upon which is rested a flat wooden tray. This flat wooden tray slides back and forth upon the runners a distance of approximately two inches. To the tray is fastened an arm E, and this arm fits upon a small gear, F. The gear F is driven by a larger gear, G, and supported by suitable bearings at H. The larger gear is driven by a hand crank. As the crank is rotated, the tray D is shaken back and forth in the oil thus freeing small nuts, bolts, screws, cotter pins or other parts, from grease and dirt.

After the oil has absorbed much dirt and grease, the drain is opened and it is drawn off through the strainer B. The strainer B may then be removed, the dirt dumped out, and the strainer replaced again, putting the cover J back into place and tightened up with the wing nut.

Strong washing soda, potash lye, or kerosene oil may be used in this vat, though kerosene is to be recommended. The whole device may be mounted in one corner of the shop out of the way, or even beneath one of the large machine tools.

I have spoken above about the various trips which a mechanic would be obliged to make from car to the

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work-bench for tools. Where the work to be done is extensive, such as the tightening of connecting rods or similar work, the mechanic would be obliged to make at least two trips to the bench for necessary tools, thus wasting considerable time. Each mechanic working in the shop should be provided with two heavy boxes measuring two feet in width, three feet in length, and one foot in depth and mounted upon casters.

In these boxes are placed all of the tools required for the particular job upon which he is working, the necessary new parts and other articles required. He can then wheel the box to the machine and remove the tools, putting them beneath the machine or upon the running boards, as convenient.

Each particular box should be numbered, and if any parts are removed from the engine or the automobile, these parts should be placed in the boxes; never upon the floor. In this way there is no danger of losing anything or mixing the jobs.

As an additional equipment for the mechanic, a board of the same dimensions as the box, measuring one inch in thickness, should be mounted upon wheels. This board may be used for wheeling heavy castings or even units from the automobile to the work-bench or to the machine shop.

Of course not all of the devices and features mentioned can be used in every garage. For instance, the automobile hoist shown in Figure 3 may be too large to be used in a small garage, but the idea itself can be applied to any garage no matter how small. Even an individual car owner can work out a scheme similar to this by fitting the roof of his garage with proper cross boards.

Every car owner should have at his disposal some means for lifting his car from the ground. Even if he does not do his own work he may want a mechanic to come in and do the work for him. His garage should be fitted with a joist running lengthwise sufficiently heavy to support the weight of the car. If the garage is too long to attempt this, he may have two or more joists running crosswise at intervals of about four feet.

Many Practical Suggestions Gleaned From Louisiana Garages

The Garagemen of the South Do Not Believe in Putting All of Their Money in Tools, They Usually Make Devices for Special Work.

BY JAMES F. HOBART, M. E.

THE writer happened into a shop recently, just as a mechanic was planing the ends of three new wooden ribs to be placed in the top of an automobile which had been wrecked while the machine was being towed to the garage. The machine had swerved out of the road just as the transmission went bad and the driver phoned for a car to haul him back to town for repairs. But when the car reached the garage, it needed far more repairing than when it was hauled out of the ditch into the road.

The person who went to tow back the disabled car was a young man with but a few months' experience in automobile repairs, but he was a capable man, and if let alone would have taken in the disabled car in a proper manner. But the driver of the disabled car was one of those important persons who feel that their opinions are everything and those of other people nothing!

Towing the Car Backward.

This man insisted that the mechanic hitch the tow-line to the back of the car and thus pull the car back into the road. This was all right and a proper way, and it was done successfully. Then the driver ordered the mechanic to pull the car back to the garage, rear-end first and the mechanic objected but was ordered by the driver of the car to proceed in that manner so he had no choice but to do so.

For a time things went well. The driver went quite slowly but was soon ordered by the man at the wheel to "hit her up" and was forced to increase the speed. Shortly afterwards the man at the wheel became confused and turned the wheel the wrong way, while passing a curve, and "bing," the car came to a mighty sudden stop, having struck squarely against a telephone pole, throwing the steersman entirely over the back of the seat he had been sitting on and mussing things up generally!

The back of the car was broken right in two, clear to the front of the rear seat and three of the ribs broken in the top of the car. Just from "plumb foolishness!"

Repairing An Auto Rear-End.

The broken rear end was repaired by stripping off all the upholstering and pressing the broken and cracked parts into place again as well as possible after which a strip of bar steel about three inches wide was worked out, bent to fit the curve of the back and arms or projections welded on to reach down along the panels of the back frame. The steel skeleton was then drilled, countersunk and fastened inside of the back by a number of flat head wood screws.

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The steel reinforcing was covered by the upholstering and, save for a very few and very small irregular or depressed places in the back, no one would ever know from the appearance of the car that the back of the seat had been smashed into kindling-wood. A bit of "touching-up" of the paint on the back of the car made it as good as new and saved the owner the expense of building an entirely new back to the car.

Fitting Top-Ribs.

Broken ends remained in some of the metal sockets and it was found necessary to burn them out. It was found that this operation might be done easily and quickly by grasping a socket with a pair of bolt tongs, heating the socket until the wood smoked, then by striking the socket smartly across the corner of an anvil that the wooden end of the rim would be thrown out usually at the second or third blow.

In fitting the new rib to a socket, it surely pays to make a pattern to fit the inside of the socket. This is done easily by using a bit of veneer for the pattern. The thin veneer, an eighth of an inch or less in thickness, may

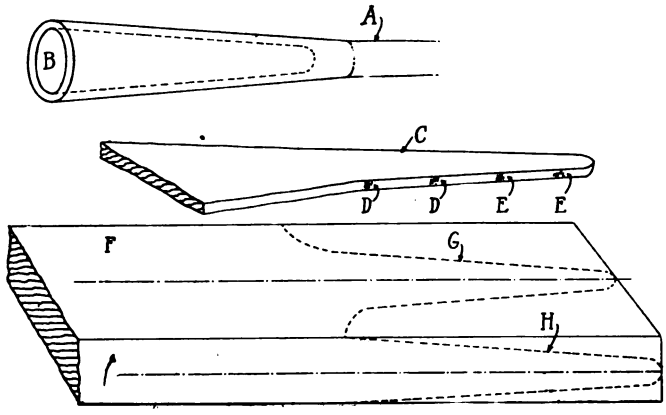


Fig. 1—Showing How the Veneer Pattern For Repairing Bows, Was Fitted.

be whittled to approximate size, twisted around inside of a socket and quickly fitted by shaving off the parts of the wood which have been marked by twisting against the metal of the socket.

Fig. 1 shows the situation. The socket A, having been cleaned out as described, a bit of veneer C, was cut to slide into the hole B, in the socket and was twisted around a few times leaving markings on the edges as shown at D D E E. These markings were carefully removed by planing, filing or with a spoke-shave, then the pattern tried into hole B, again more markings were made and the piece cut to shape. This process was repeated until pattern C fitted inside of the socket as well as was necessary.

The pattern C was then placed with the center line upon rib F, and a mark made around the pattern as shown at G. The marking operation was repeated on the edge of the top-rib at H, after which the rib was sawed to both dotted lines and it was but the work of a very few minutes to round up the end of the rib and to make it a good fit inside of socket A. By the marking and sawing-out method, the end of the rib was brought to the proper shape at once and the tenon thus made was always central with the length of the rib.

Revised Traffic Signal Rules.

Owing to the large and increasing number of accidents in New Orleans, due it is claimed to confusion of signals because of the many methods employed for signaling to cars approaching from the rear, a revised code of "wig-wag" signals has been prepared and was put in force a short time ago. Briefly stated, the revised signals are as follows:

> The left arm extended horizontally and held stationary means that you are preparing to turn to the left. Moved up and down, that you are preparing to stop. Rotated slowly clock-wise, that you are preparing to turn to the right. This applies to all vehicles with left-hand drive.
>
> In vehicles with right-hand drive, signals should of course be given with the right arm and the turning signals should have the reverse meaning.
>
> These signals must be given only by the person who is driving the car.

In the Crescent City, on St. Charles street, also on Canal street, mornings especially, car drivers occasionally stop near to the neutral ground to pick up friends who may be standing on neutral ground at the crossing waiting for street cars. This is a dangerous practice and has resulted in several accidents, particularly when the streets are slippery; the practice has been forbidden in the following law:

> No car shall ever stop with its left side near to the curb of the neutral ground, but should pull over to the right before coming to a stop thereby avoiding not only a dangerous practice but a violation of the law which the public safety requires shall be rigorously enforced in the future, beginning forthwith.

A remarkable accident which recently took place on the principal street of New Orleans, shows the necessity for care in parking cars, particularly on side streets close to street-car track intersections with the main street. A trolley car recently jumped the track upon a curve, and before the car could be stopped it ran across the inward tracks on the curve and crashed into an automobile that was parked there.

The "wild" car struck the automobile a "quartering" blow, drove that car back against the one behind it, and that car was forced against another and so on down the line until five cars had been damaged to an aggregate extent of nearly $1,000, police estimate. The strange thing regarding this accident was that the trollev car was not damaged in the least, or even scratched, while the fenders, mud-guards, head and tail lamps and other external parts of five cars were "made into a regular omelette," as one of the large number of bystanders who witnessed the accident expressed himself regarding it.

The lesson is obvious—don't park too close to a curve in the street railway track, across which curve a street car may shoot in case of a derailment.

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An unusual application of a Republic Motor Truck was recently seen by the writer when visiting the round-house of a small steam railroad near New Orleans. This road, The New Orleans and Gulf Coast Railroad, has sixty miles of track which extends through some of the richest "truck farming" lands in the United States. Every short distance along the road a farmer has a platform where he places the "garden-sass" in readiness to be picked by the freight trains which work along the road.

It was quite a slow task for the freight to stop at every little platform along the road and it was absolutely impossible to make any speed, so the railway management procured a large Republic truck and built thereon a slat body—the sides and top were of slats about 4 inches wide and one inch thick.

The body was as wide as a freight car and was fitted with a sliding door which locked the same as a regular freight car door. The slat body was about sixteen feet long and nearly balanced over the rear axle. This modified motor truck was fitted with regular railroad car wheels, rims in place of rubber tires and the front axle had been clamped rigidly to a bar of steel, forged to fit that axle.

This truck was run over the road, ahead of the regular freight train and picked up and receipted for the produce which the farmers had placed upon their platforms. At intervals of about five miles the motor truck deposited the loads it had picked up and at these places the produce was transferred to the regular train, which was thus enabled to make far better time to the city than when it made from two to ten stops per mile.

Pipe Wrench Repairs!

A car was recently towed to a repair shop with one "corner" resting on a piece of scantling and one wheel inside of the car. Some genius (?) had attempted to remove the ball bearing from one of the wheel hubs and, not having the proper wrench for that work, had evidently pulled upon the nut with a big pair of pipe tongs. The screwed bushing-nut didn't come out under that treatment, but the flange which served as a nut did come

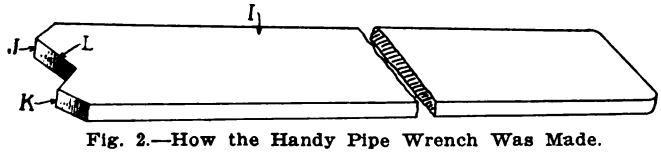


Fig. 2.—How the Handy Pipe Wrench Was Made.

off—in pieces—and it broke well down, inside of the hub.

The "Wrench Man" abandoned the job at this stage of the game and brought the car to the shop as above described and the broken nut-bushing was finally removed by a mechanic after a good deal of trouble and the forging of a special tool for the work. Fig. 2 shows the tool which was made from a worn-out 12-inch file from which the temper had been removed. The piece of file-steel is shown at I, and at J is shown a sharp point made at an angle of about 90 degrees.

At K, another and similar point is shown, and when the tool is to be used, point J is placed against some projecting broken corner of the nut and hammer blows are delivered upon the other end of tool I in hope of starting the sleeve-nut from its seat. It was found difficult in many cases to make joint J "bite" the broken nut,

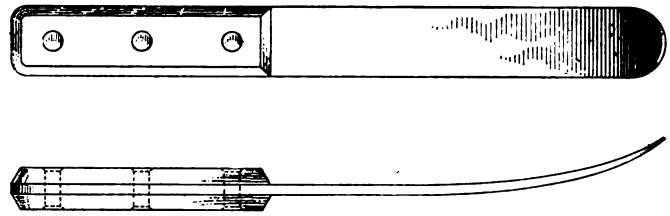


Fig. 3—The Tire Iron, Made From a Broken Spring Leaf.

trouble being met with by the tool jumping or slipping off under the stress of the hammer blow.

To remedy this trouble the second point K, was made. When using this point the tool may be so placed that the flat place L will bear against the broken surface, upon one of its points, while point K engages the point a short distance below, and thus enables the workman to hold the tool firmly in place while the blows are being struck, avoiding the danger of the point slipping off of the projection of the broken nut against which it may have found a lodging place. With this tool the broken nut was quickly "backed" out of the hub.

Locking An Automobile.

The writer has noticed many cars recently which the owners had left parked along the curb with evidently a good deal of confidence that the car would be awaiting the owner when he came out of the theater after the show. The very business-like manner in which these cars were secured was to procure a piece of stout log-chain about four feet long and made of 7/16 inch or ½ inch steel rod.

The chain would be threaded through a front wheel, passed between two of the spokes, then around the rim and then through the end of one of the forward springs. Some of the owners used a chain so short that it was necessary to turn the rim of the front wheel toward the spring before the ends of the chain could be brought together.

The ends of the chain were united by a padlock. One made of brass is preferable because it does not rust when exposed to severe weather conditions. A very large padlock was used, one with as large a bail or hook as could be made to pass through the chain-links. Such a large lock was preferred to provide the strength necessary to prevent the lock from being broken by a smart blow from a hammer or a wrench. A small lock would be broken easily in that manner

The chain was made as short as possible, even to the pulling of the wheel around, and then barely long enough to allow the lock to connect the ends of the chain. It was made short in order to preclude the possibility of thrusting a piece of steel rod or pipe through the lock

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and then twisting up the slack of the chain until further twisting tore the bail or hook bodily from the lock, leaving the car at the mercy of the thieves.

With no slack in the chain there was danger of breaking a wheel, a knuckle or the spring before the lock would be torn apart, hence the use of a very stout lock, a very stout chain, the links of which would take up as much room as possible under the bail of the lock, thereby making it almost impossible to break off the bail without doing so much of a hammer job that the attention of the police would be drawn to the operation.

A very handy tire removing tool was recently seen "at work" in a garage, and a right handy tool it proved, too. It was, as shown by Fig. 3, simply a piece of broken spring-leaf. Instead of using the piece just as it was broken off, or by forming a handle by the winding on of half a dollar's worth of electrical friction tape around the broken end, this garage man had planed out two bits of wood, placed one on either side of the spring, drilled right through wood and steel, put in three flush rivets, and the tool was complete, perhaps with a little rounding of the corners on the grinding wheel.

The Construction and Repair of Radiators

Part 1.—How This Important Part of the Cooling System Is Made and How the Honeycomb Type of Radiator is Repaired

BY M. J. HENNESSY, M. E.

A WELL-KNOWN manufacturer has a slogan which runs: "An engine is no better than its cooling system and a cooling system is no better than its radiator." I think we may take the privilege of changing this statement to read that an automobile is in no better condition than its radiator. We are united in the understanding, of course, that an automobile engine must have a very high temperature to work efficiently. A good radiator keeps the engine at the right temperature. It is no uncommon thing, however, for an engine to overheat in spite of the radiator. So, you see, we must be careful to avoid pinning the sins of our engine on our radiator.

The first radiator used on automobiles consisted of a series of coiled pipe; very much similar to the steam coils to be seen on the walls of nearly every garage or factory. These coils were placed on each side of the hood, or bonnet. The next step in the evolution of the radiator was to put fins on the coiled pipes. About this time a few of the more radical makers moved the two heaps of coiled pipe from the sides of the engine, placing them in one pile in front of the engine. Then, also, the Renault Bros. brought out a radiator which was practically the same as the present-day radiator. They, however, placed the radiator behind instead of in front of the engine. This radiator consisted of a core of vertical tubes set into two header plates. These header plates, in turn, formed integral parts of a tank, the whole business then being soldered together. Thus, you see, with the exception of different styles of cores and with the further exception of what is known as the cellular type, radiators are practically the same in general as they have been for many years.

The honeycomb section type of radiator is, without doubt, the most widely known and the least understood. From the front view, this type seems to be a square grid. Around each of the squares is a water passage. The section, as it is called, is made up to order, and can be bought by the repair man from any of the firms who manufacture radiators.

The method of building a radiator, while it varies in detail with the factory in which it is made, is near enough to being universal, to merit some description. The shape and size are, of course, specified by the car builder. The frame or outside case determines the finished shape. The base is usually a fairly heavy plate, from a quarter to three-eighths of an inch thick. Very often the thickness of this plate depends on how the radiator is to be anchored. In some cases it is made in the form of a "U," the sides of the "U" coming up to about one-third the height of the radiator. On this base a frame of sheet metal is made, either of brass or sheet iron, coated to prevent rust.

The edges of the frame are turned in such a way as to be used for a seam later on. The core is, as a rule, made in rectangular form. The strips or layers of section are coated on the faces which are to be joined together with a flux of some sort. The layers are set one on top of the other and in such a way that the water and air passages will line up. They are then clamped together and immersed in a bath of solder. Following this, the core is next placed in the frame, centered, and then fastened into place by means of face plates on the back and front of the radiator. These plates not only hold the core in position, but also form the sides of the tank.

First Locate the Leak.

In repairing a radiator of this type we must first locate the leak, exactly. The best way to test a radiator is to first have a tank or tub large enough to submerge the radiator completely; then take three pieces of sheet brass

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or copper, in one of which has been inserted a tire valve, clean the edges of the three openings in the radiator, namely the filler hole, the outlet, and the return pipes (in the case of a "V" type engine you will have four openings to close) and solder your plates on to each opening.

This, I admit, sounds like a lot of preliminary work, nevertheless, after the first job is completed, when you have your plates all ready, it takes but a few minutes to solder them on and you will be well repaid by the ease with which you can make the test. A cork will suffice to plug the overflow pipe and if it is not driven in too tightly will act as a safety valve. Now place the radiator in the tank, cover it with water and attach a hand or foot pump to the valve. Be very careful and sure to use a low pressure pump. Never, under any circumstances, use the air line from a pressure tank or air compressor. Just a few strokes with the hand pump will show every leak in a radiator.

If the leaks are in the frame or sheet metal parts of the radiator, you can safely mark them with any kind of a sharp point. If, however, the core is leaking it is better to mark the leaking cells by rolling a paper pill and putting it into the leaky tube until you take the radiator out of the water.

My reason for recommending the air test instead of a water test is as follows. If you desire to test with water it is necessary to stand the radiator upright in its natural position in order to fill it and also to have all parts of the radiator exposed for your inspection. You will probably stand it on a box or a couple of horses. The men who can fill a radiator under such conditions, without either slopping the water over it, or knocking the radiator off the stand, are about as scarce as the fellow Diogenes hunted for so long and to such little purpose.

When the sheet or smooth surfaces get wet it is, of course, a simple matter to dry them and locate the leaks. Not so with the section, should you spill a couple of tablespoonfuls of water over the core of a honeycomb radiator and then try to dry it with a rag or a piece of waste. Before you get it dry you will decide that the air test is better. Experience shows that, by far, the great majority of radiator leaks are found in the seams of the tank and the joints of the core and tank. The parts which are attached directly to the chassis, or which are in direct contact with the chassis, are the worst offenders.

Next in order are the outer edges of the core where they are joined to the tank. There are a great many cases of apparent leaks in the core which are really in the upper joint. The water oozes out, slips past any number of cells which happen to have enough of a grease coating to allow the water to pass without leaving a trace, and finally settles in a cell which may be anywhere from an inch to a foot away from the actual leak. Many a good radiator is transformed into a sieve by futile efforts to solder a leak which does not exist.

In soldering these joints be careful not to have the iron too hot. Use strip solder if possible, as it runs at a lower temperature than the heavy bar solder. Have the part thoroughly clean and work the solder *into* the leak. One grain of solder properly worked into a leak is better than a pound of solder smeared over the outside of the job. Use well killed acid in preference to any other compound as it helps to clean the surface in addition to its properties as a flux.

Leaks in the Core.

If the leak is in the core, the first thing to consider is its extent. If it is a case of occasional scattered cells, then, by all means, solder them up. To do this you will require a soldering iron (preferably a square one) which will enter the passage far enough to pass the center. The best tool for this job is a fairly large heavy iron which has been forged out from a little more than half its length and drawn to a square point, thereby leaving a heavy butt, which will hold the heat.

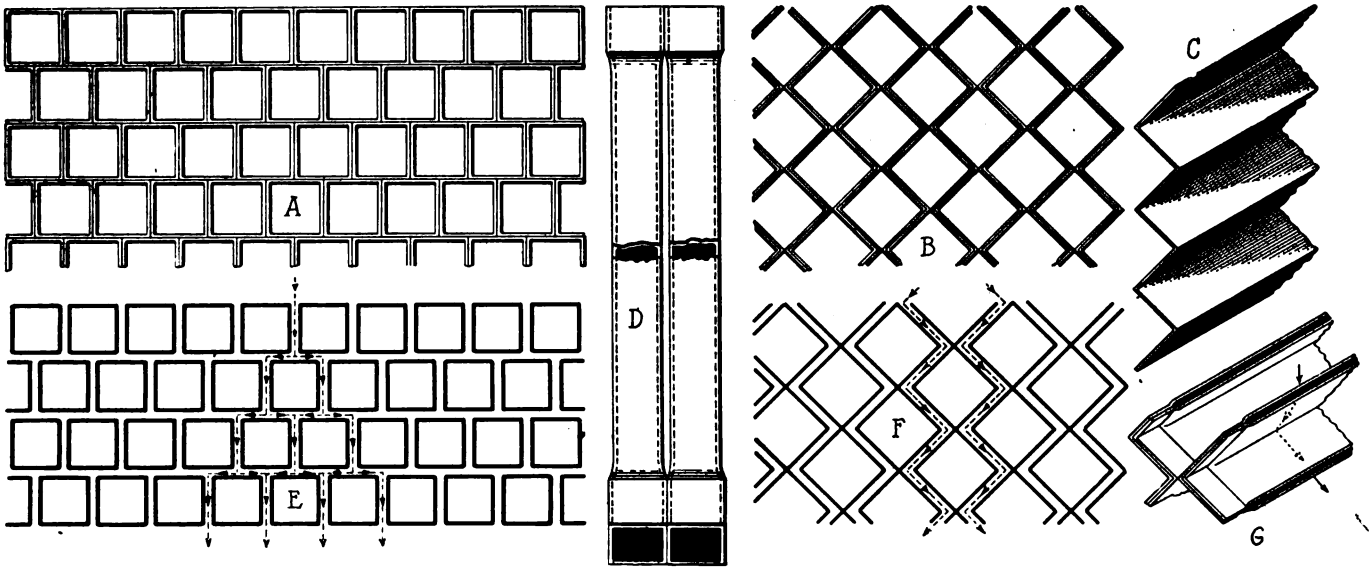


Fig. 1—Sectional Views of Various Honey-Comb Radiators. A, End of True Honey-Comb; E, Cross-Section of Same; C, Strip from Imitation Honey-Comb or Cellular; B, End of Cellular; F, Cross-Section of Same; G, Showing How It Is Soldered; D, Tube From Honey-Comb Radiator. Arrows Indicate Flow of Water.

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Everyone who has had any experience with solder must realize the absolute necessity of having the metal to be soldered thoroughly clean. A minute speck of dirt or grease will leave a very much larger hole than itself in a soldered joint. Therefore, before wasting any time in trying to solder the tube, *clean* it. The best method for cleaning these tubes is to take a piece of rod, tool steel if possible, grind a chisel point on it, heat it, and make a very short right angle bend in it. With this tool one can scrape the inside of the tube and then proceed to solder up the leak.

You will sometimes find a case where the wall of an isolated tube has broken down completely. In that event it is simply impossible to get it sufficiently clean to hold the solder because of the dirt and corrosion which is present in the water passage. Where you have but one or two, or even half a dozen such leaks scattered over the radiator, the safest way to deal with them is as follows:

Clean the tube for a depth of about three-eighths of an inch from both ends. Then take a piece of wood and trim it down until it is square and a sliding fit in the tube; cut it off about a half inch shorter than the tube, push it into the tube so that the tube is open for about a quarter of an inch at each end and then fill both openings with solder. I do not recommend this method for wholesale use on a radiator. As you can readily understand, if you have enough of the air cells plugged in this fashion you will seriously affect the efficiency of the cooling system.

In the case of a radiator which has had a hole punched in it, or has been dented in such a way as to damage any considerable part of the section, the repairs are necessarily a more complicated proposition. The first point for consideration is, what kind of a honeycomb are you "up against"? Is it a true honeycomb as shown in Fig. 1 at A, or is it one of the dozens of different imitations, one of which is shown at B? If the former, you can remove the tube bodily by simply sticking a hot soldering iron into both ends of it. The real honeycomb core is just a mass of square tubes, soldered together for about a quarter of an inch at their length at both ends. The imitation consists of long strips of the shape shown at C, soldered together at the edges for about the same distance. It is, therefore, impossible to remove any part of the imitation without cutting.

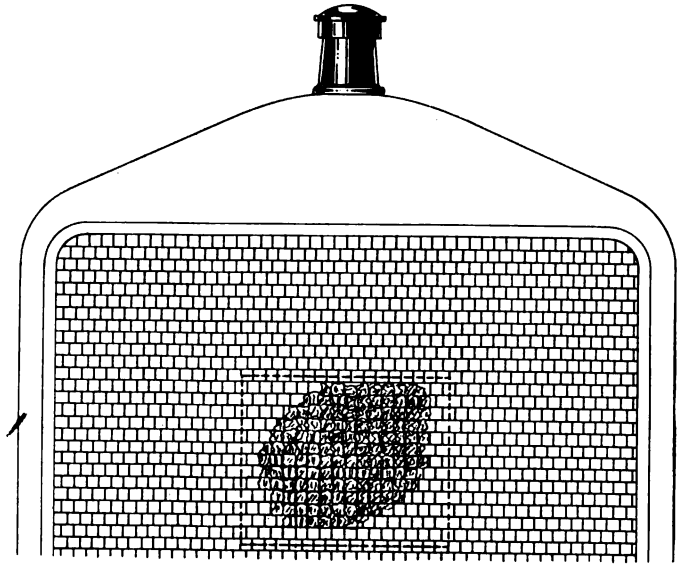


Fig. 2—A Badly Damaged Honeycomb Radiator and How It Was Repaired. Dotted Lines Show Portion Removed.

A man who is a real expert in the line can take a piece of almost any size out of a core and replace it with new section, without affecting the circulation; but it is a safe bet that the average radiator that is repaired in this way has no water circulating in the new section. The usual repair is made about as follows: Fig. 2 shows a radiator with a hole punched in the center. The tubes are smashed in and bruised out of shape in such a way that we know it is useless to attempt straightening them up and soldering them. The first thing to do is to draw a square around the damaged area, keeping the square as small as possible, at the same time making it large enough to include all the bruised parts, as shown by the dotted line in Fig. 2. Now take a very thin and very sharp chisel and cut away the bad part of the section.

For this part of the job you will require, in addition to a very sharp tool, considerable time and patience. Keep the chisel well away from the line you have set as a boundary and finish down to the line with a file. You should now have a square hole, the sides of which are quite smooth but full of tiny openings, through every one of which the water would pour. These openings must all be soldered up carefully and here again don't forget your patience. When you think you have it perfectly tight, test it and test it carefully, as you will have no chance to get to these leaks after you put the patch in place.

When you are satisfied that the radiator is watertight take the new piece or section and fit it into the hole, being careful to see that it fits snugly and that the tubes line up and match properly. Then, when it fits perfectly, solder it in at both ends. Work the solder in at least a quarter of an inch from each end, wipe it off clean on the outside and you have a good solid job.

It is well to remember that the main points for the success of this job are first to have the radiator thoroughly airtight before beginning to fit the plug and second to get a perfect fit on the plug before soldering it in.

(Editor's Note.—Our readers who intend to do radiator repair work should investigate the Dover electric soldering iron.)

(To be continued.)

How do you feel toward your competitors? Do you regard them as dark villains who ought to be in the front line trenches, or have you reached the modern standpoint of regarding them as co-operators, ready to make better conditions for business so that all may profit by it?

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How to Place and Distribute Advertising So That It Will Give Results

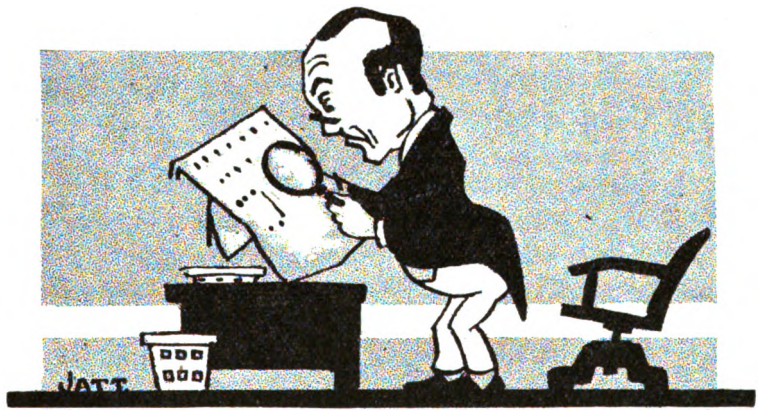
4.—Daily Newspapers, of the Right Kind, Are Good Mediums For Dealers and Garagemen, But the Advertisement Must Be Distinctive

BY FRANK FARRINGTON
Illustrated by JATT

THE question of where to advertise is an important one when it comes to consideration of the use of newspaper space. Even if you never did any newspaper advertising, you realize that there is a vast difference in the newspapers of your town, whether they are weekly or daily papers.

One paper may have a large rural or suburban circulation and little circulation in the city proper. One may have a large mail subscription list and few newsstand buyers, or just the reverse. One may be sensational and perhaps cheap, with an appeal that makes it a favorite with the laboring classes. Another may be the favorite of the sporting fraternity.

It is easy enough to see that the cheap sheet that is bought mainly by factory operatives and laborers is not the one that is going to reach the people who own or will buy automobiles. A paper that goes to farmers mainly is not the paper for the automobile dealer who wants to advertise town cars or limousines or high priced heavy type cars. On the other hand, it is just the paper that will bring the best results in advertising cheap and moderate priced cars.



Don't Expect Your Readers To Use A Magnifying Glass In Order To Read Your Advertisement. Use Enough Space. Don't Crowd the Words and Have the Type Legible.

A good many garage men, when planning to advertise in the newspapers, think that they are all pretty much alike and they take space in all of them regardless of class of circulation. This can only result in a waste of advertising money. You pay for the advertising space at a rate that is based on the entire circulation of the paper (and sometimes something beside), and all of that circulation which goes to people who are in no way possible producers of business for you is waste circulation as far as you are concerned. You pay for it but it does you no good.

So you should see to it that you use the paper, or perhaps papers, that have the kind of readers you want to reach. In advertising the repair department, although you may handle only low priced cars, you want to reach the high priced owners, so a paper that might not be suitable for your car advertising might be just the one for repair advertising. The proposition is simple enough in principle. Use the paper that reaches the people you want to have read your advertisement.

Don't be satisfied to use space occasionally. Occasional advertising will not produce even occasional results. That is the reason so many men say that advertising does not pay them, that they have tried it and it did not get them any business. There is only one way to make newspaper advertising pay profitably and that is to stick right to it, week in and week out, hammering away constantly.

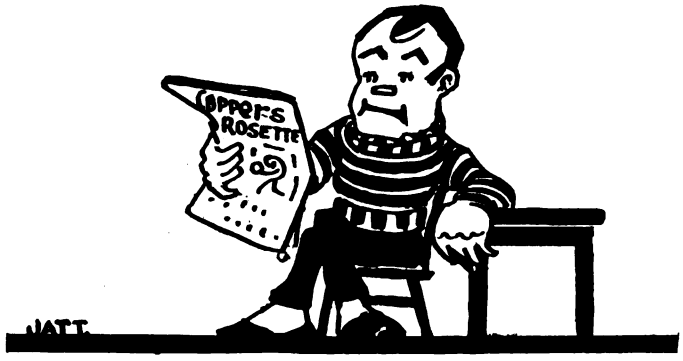
And don't, please don't, put one advertisement into the paper and let it run the same indefinitely. People will not read stale news. They would throw away a paper that printed the same news over again the second day. You surely cannot expect them to read advertisements over and over again. Your advertisements are not going to be so much more interesting than news.

I know you may say that if you run the advertisement the second time someone may see it who missed it the first time. Well, that someone will see your new advertisement just the same as they would the old one and the people who saw the old one will read the new one, too. There is no excuse for repeating advertisements. You may lack time to get up a new ad. Provide in advance for such a contingency by having some new ones always ready for the busy times.

Location of the advertisement in the paper is almost as important as choice of a paper. You know of pages in your newspaper that you never look at, seldom turn to at all. What pages they are depends upon what your

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interests are. Automobiles and automobile repairs are subjects you want to advertise to all classes of readers. You do not want to restrict your advertising to the baseball fans, so you will not choose the sporting page for your space. You do not want to restrict it to the



A High Class Automobile Advertisement Will Not Bring Results if Placed in a Sporting Paper.

church workers, so you will not go on the page devoted to religious interests. Similar reasons may eliminate other pages. But everyone who takes the paper is interested in the local news, so you will try to get the kind of space you want on the page that talks about what folks in your town are doing. You know that everyone looks at that page—perhaps first of any and longest.

Get space in the right paper, on the right page, and then try for the position you want on that page. First off you will not be able to get the best space, because that will be in use by older advertisers. But if you continue to use space on that page, while others drop out, or change, you will in time have the rights that seniority gives. You will get the best space for your business.

Consider something beside the cost in deciding what size space to use. The automobile business is regarded as being a rather large one. A garage is not a small affair. Use space that bears a proper proportion to the size of your business as it looks to the public.

If your business is small or new, or if you are really short of funds, use a small space, a real small space. Perhaps two or three inches, single column, will enable you to call attention to your repair shop. Small space like that will not be out of place in advertising repairs or certain accessories and supplies, but it does not convey the impression of the successful distribution of cars. In advertising cars, you ought to use five inches or more, double column and rather than use a space so small that it gives the impression that you are kind of a "piker" dealer, use the space less frequently, perhaps three times a week in a daily paper. You ought not to cut the weekly paper advertisement down to less than once in two weeks.

The kind of advertisement you use will depend, of course, on the amount of space, the type of newspaper and the class of trade you want. But any advertisement should be adapted to a style you want to follow in order to get people accustomed to it. You want people to recognize your advertisement at a glance, and you want to make the advertisements so attractive that people will look for them.

Instead of allowing the printer to set up your advertisement in any type he wishes, see that he uses a type that is suited to it, and then have the same type used every time. Follow a uniform style of typography. See that your advertisement is set in a type different from that of the advertisements around it, so that it will be different and stand out more. You probably do not know anything about typography, but that does not mean that you cannot follow out this idea. Go and see the man who sets up your advertisements and have him show you the different styles of type he can use for your advertisement. Then you and he choose the one that is best and stick to it. If there is no assurance that you will not find the same type used by the man whose ad is right adjoining yours, you may be willing to buy a font of a special type for your own exclusive use for headlines and display lines in your own advertisement alone.

Be Distinctive and Original.

You ought at least to have a distinctive type for the name or signature to your advertisements. The best way is to have a nameplate drawing made, showing "King's Garage" in a unique lettering, or if you write it in a rather striking form with a pen, have a cut made reproducing the signature just as you write it. Such a cut will cost very little and the printers will get it for you. You would want it made in several sizes so you could use it on advertising of all kinds, and you may even want to use it on your letterheads. The idea is to make that distinctive nameplate an identification



Be Careful in Preparing Your Copy Not To Make It Read Like a "Mess of Hash."

mark for your advertising, just as Kellogg's name on his corn flakes advertising and packages is a distinctive signature.

It is a good plan, too, to follow a certain style of make-up in your advertisements. You might always run a heavy headline and a single descriptive line under it always in italics. You may set your headlines clear to the left-hand margin of the space and then indent the

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rest of the advertisement half an inch, that is, leave half an inch of margin all the way down below the



The Sporting Pages May Attract Attention But the Readers May Not Care for Your Product.

headline. Here is a sample of the way the two above ideas would work out. First, with the italics sub-head.

WE MAKE QUICK REPAIRS.

No Garage Gives More Prompt Service.

When your car gets out of order, you want it right away. You never seem to need it as badly as when it is broken.

We make a specialty of quick service where the car is wanted for immediate use.

If we can't make a permanent repair in time, we can often make a temporary repair that will help. When parts are not to be had promptly, and that is often the case now, a temporary repair that gives you your car for careful use at least, helps a good deal.

Anyway, when something goes wrong, come right to us and we will give you immediate attention at least to the extent of telling you how long repairs will take.

KING'S CENTRAL GARAGE.

Here is the sample of the advertisement with the body matter indented and the heading set close to the left-hand margin:

THERE'S ODDS IN OIL!

Some motorists buy and use oil on the apparent plan of believing that oil is oil and that one oil is as good as another.

They buy the cheapest because it looks as if it would save them just that much money.

You probably don't buy oil that way, but maybe some of your friends do. Compare notes about oil results, about burnt out bearings and about a lot more results from poor oil.

A customer of ours said the other day, "I used to pay 50 cents for oil and I thought it was high at that. That was before I had the car overhauled and found what poor oil was doing to the motor. Now I pay 85 cents for oil and if I could find an oil that cost a dollar eighty-five I'd buy that. You can't make me believe the cheap oils are cheap in the end."

Let us show you what Tinkertown Oil will do in the way of saving wear and tear and making the car work right seven days in the week.

KING'S CENTRAL GARAGE.

The plan followed by the advertisers whose space is next to yours has its influence on the plan you adopt. If the adjoining advertisers all leave a wide margin of white space around the type matter in their ads, you can set yours pretty close to the line and thus profit by their white space and have more room for reading matter. On the other hand, if they all set their space full of type and leave no margin, then you must provide your own margin. You must have a margin if you want your advertisement to stand out. The proper use of white space in an ad is almost as important as the proper use of type matter.

Sometimes an advertisement can be made to stand out without white margin, but it must be done by main force. If you are using a single column space and the advertisements around you or the adjacent reading matter all appear in comparatively small type have your ad set in 18 point type. The printer will show you what this size is. A "point" in type size is a seventy-second of an inch. The reading matter on this page, for example, is 10 point. Don't have the advertisement set in capital letters but in small letters, and if you are carrying out this plan use a black face type, one that is heavier than ordinary. In this way you make your advertisement so black and conspicuous that it compels attention. This is not an artistic method of getting attention, but sometimes it pays, and, after all, the test of a successful advertisement is its pulling power.

The inexperienced advertiser often crowds his space, puts in too much matter. He is anxious to get his money's worth. Unless you use space large enough to subdivide it somewhat, as the department stores do, it is better to try to make just one point, to impress just one thing upon the reader, so he will pass on, remembering one thing rather than forgetting a dozen. One good point driven home is enough. Accomplish that with each appearance of your advertisement and you have done as much as you need to do.

Do you pay yourself a regular salary? No matter if you are in business for yourself—what of it? You should take every Saturday night as much as you could earn by the same effort if you worked for someone else. Then charge yourself up at cost price with anything you use out of the business. That is the only way to keep matters satisfactory and to know at the end of the year whether you have gained or lost.

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The A B C of Modern Magnetos and Electric Generating Systems.

Part 2.—How Current Is Generated in the High Tension Magneto and Directions For Installing and Wiring This Important Unit

BY A. P. PALMER, E. E.

A MAGNETO is a machine for generating current of the simplest and most direct kind. An armature is revolved between two ends of a permanent magnet to which pole pieces are attached. As the fields are permanent no excitation is required and hence no field coils.

A magneto adapted for four cylinder ignition is shown in section in Fig. I. It consists of an armature revolving between the cast steel pole pieces of two permanent magnets. The armature has two windings, one of heavy wire and the other of very fine wire. The heavy wire constitutes the primary or low tension circuit and the very fine wire the secondary or high tension circuit.

The rotation of the armature between the poles of strong permanent magnets sets up or induces a current in the armature primary circuit and this is further augmented at regular intervals in the rotation of the armature shaft by the abrupt interruption of the primary circuit by means of the magneto interrupter. At the opening of the primary circuit the resulting discharge of current from that circuit induces a current of high voltage in the armature secondary circuit. The high tension current thus created is collected by the slip ring on the armature and passed through the slip ring brush, then to the various magneto distributor terminals, each of which is connected by cable to the spark plug in its respective cylinder. The electrical circuit is shown in

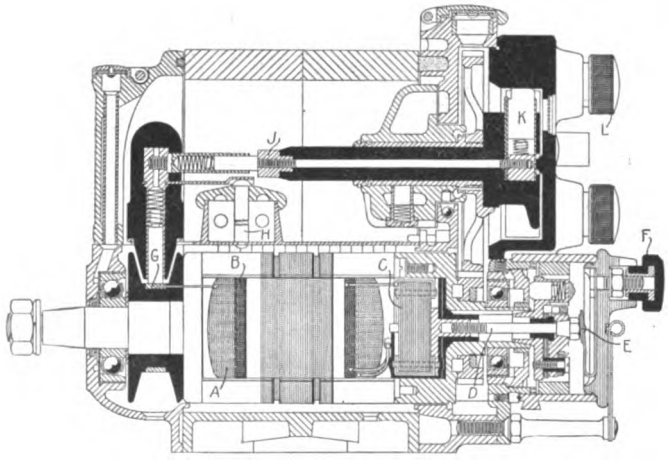


Fig. 1—Sectional View of High Tension Magneto. A, Secondary Winding; B, Primary Winding; C, Condenser; D, Primary Contact Screw; E, Contact Spring; F, Grounding Terminal; G, Secondary Ring; H, Safety Gap; J, Secondary Connection Post; K, Distributor Brush; L, Distributor Terminal.

Fig. 2 at A while a six cylinder distributor is shown at B.

The beginning of the armature primary circuit wire is in metallic contact with the armature core, and the end of the armature primary circuit is connected by means of the interrupter fastening screw to the insulated contact block supporting the long platinum contact on the magneto interrupter. The interrupter lever, carrying a short platinum contact, is mounted on the interrupter disc, which in turn is electrically connected to the armature core. The primary circuit is completed whenever

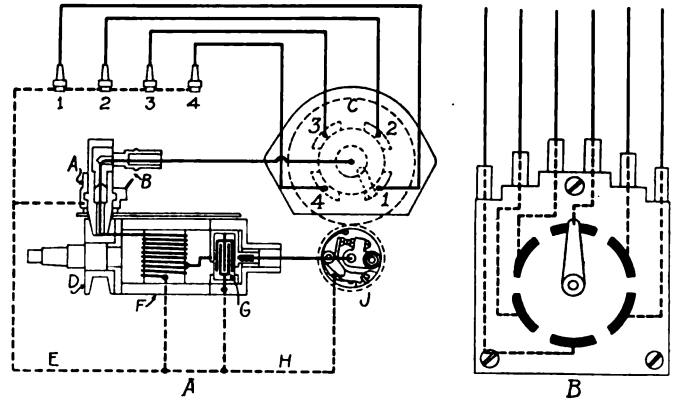


Fig. 2—A, High Tension Magneto Circuit; B, Six Cylinder Distributor. Small Letters—A, E, & H, Indicate Ground; B, Secondary Lead Wire; C, Distributor; D, Secondary Collector Ring; F, Armature; G, Condenser; J, Breaker Box.

the two platinum interrupter contacts are brought together, and interrupted whenever these contacts are separated. The separation of the platinum contacts is controlled by the action of the interrupter lever as it bears against the steel segments secured to the inner surface of the interrupter housing.

The high tension current is generated in the secondary circuit only when there is an interruption of the primary circuit, the spark being produced at the instant the platinum interrupter contacts separate.

Secondary or High Tension Circuit.

The armature secondary circuit is a continuation of the armature primary circuit, the beginning of the secondary being connected to the primary, while the end of the secondary is connected to the insulated current collector ring, or slip ring, mounted on the armature just inside the driving shaft end plate of the magneto.

Metal segments are imbedded in the distributor plate and as the distributor brush rotates it makes contact successively with the segments in the distributor plate.

The segments in turn are connected with the terminal studs on the face of the distributor plate, and the latter are connected by cables to the spark plugs in the different cylinders. In the cylinders the high tension current produces a spark which causes ignition and then returns

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through the engine to the magneto armature, thus completing the circuit.

In order to protect the armature and other current carrying parts, a safety spark gap is provided. Under ordinary conditions, the current will follow its normal path to the spark plug, but if for any reason the electrical resistance in the secondary circuit is increased to a high point, as when a cable becomes disconnected, or a spark plug gap too wide, the high tension current will discharge across the safety gap.

The current should never be allowed to pass across the safety spark gap for any length of time, and if the engine is operated on a second or auxiliary ignition system, the magneto must be grounded in order to prevent the production of high tension current. The snapping sound by which the passage of the current across the safety gap may be noted should always lead to an immediate search for the cause of the difficulty.

The safety spark gap is located on the dust cover over the armature, and consists of two short pointed electrodes supported a short distance from each other; one electrode is set on the dust cover itself and enclosed by a metal and wire gauze housing, while the other, or insulated electrode, is set in the center of the steatite cover of the safety spark gap housing and connected into the secondary circuit of the magneto.

Timing Range.

The magneto interrupter housing is arranged so that it may be rotated through an angle of 35° with respect to the armature shaft. The movement of this housing in one direction or the other causes the interrupter lever to strike the steel magnets earlier or later in the revolution of the armature, the spark occurring correspondingly earlier or later in the stroke of the piston. The spark can be advanced by moving the interrupter housing by means of the timing control arm, in the direction opposite the rotation of the armature and can be retarded by moving the interrupter housing in the same direction as the rotation of the armature. The armature rotation

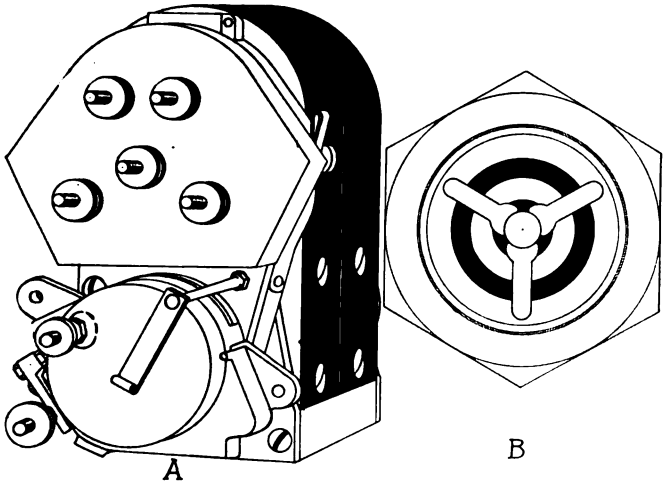


Fig. 3—A, Typical High Tension Magneto; B, Multiple Point Spark Plug.

is indicated by the arrow on the oil well cover at the driving shaft end of the magneto.

Since high tension current is generated only on the interruption of the primary circuit, it is evident that in order to cut out the ignition it is necessary merely to divert the primary current to a path which is not affected

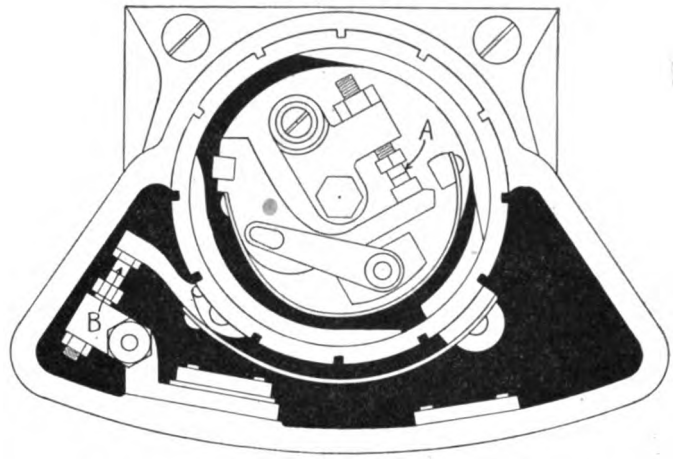


Fig. 4—Breaker Box of Dual Magneto. A, Magneto Breaker Points; B, Battery Breaker Points.

by the action of the magneto interrupter. This is accomplished as follows:

An insulated grounding terminal is provided on the cover of the magneto interrupter housing with its inner end, consisting of a spring with carbon contact, pressing against the head of the interrupter fastening screw. The outer end of the grounding terminal is connected by low tension cable to one side of a switch, and the other side of the switch is grounded by connecting another cable between it and the engine or chassis.

When the switch is open the primary current follows its normal path across the platinum interrupter contacts and is interrupted at each separation of these contacts. However, when the switch is closed the primary current passes from the head of the interrupter fastening screw to the carbon contact of the grounding terminal, thence through the switch to the engine and back to the magneto, and as the primary current remains uninterrupted when following this path no ignition current is produced.

Plug Gap Too Wide.

The distance between the electrodes of the spark plugs varies according to the individuality of the engine, but normally this distance should not be less than 1/50 inch. On the other hand, however, too wide a gap increases the electrical resistance, and interferes with the proper generation of current at low speed. Difficulty in starting an engine and missing at low speeds are very often due to the spark plug gaps being too wide and, as the spark will have a tendency to burn the electrodes and thereby gradually increase the gap, it is especially important that the plugs be examined occasionally for assurance that the gap is not too great; any difficulty due to this cause may be readily overcome by readjusting the electrodes.

Air gaps placed in the high tension circuit between the magneto and the spark plugs for intensifying the spark only increases the length of the gap and the resistance to be overcome and should not be used.

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The platinum interrupter contacts should be examined for the correctness of their adjustment and they should be so set that they are separated by a distance of 0.4 of a millimeter (about 1/64 inch) when the interrupter lever is resting on either of the segments in the interrupter housing.

Installation of Magneto.

Since the magneto produces an ignition spark only at certain definite points in the rotation of its armature, it must be connected to the engine in such a manner that the spark is available always at the instant when required in the cylinder, i. e., about top dead center of the compression stroke. The magneto, therefore, must be positively driven from the engine by a method of drive that

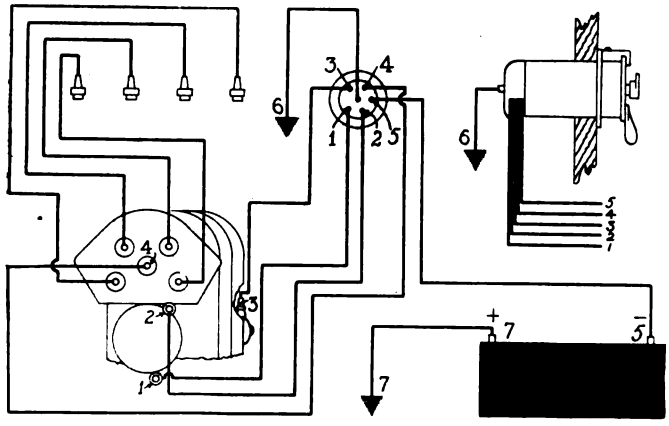


Fig. 5—Low Tension Magneto With Coil.

will eliminate slippage; belt or friction drive cannot be used.

In a four cylinder four cycle engine, with a magneto producing a spark every 180° revolutions of the armature, the speed of the engine crankshaft and magneto armature should be the same. With a six cylinder engine, four cycle, the magneto is run at one and one-half times engine speed.

The magneto should also be installed so as to revolve in the direction in which it is to run as indicated by an arrow sometimes placed at the shaft end of the magneto.

Timing the Magneto.

1. Find firing order of the engine.
2. Set number one. Piston on the beginning of the power stroke (by watching the exhaust valve just closing on No. 4 cylinder).
3. Set flywheel so that the mark (1 and 4 TC) registers with pointer.
4. Retard the spark fully by moving the breaker box in the same direction as arrow points, or armature rotates, as far as it will go.
5. Rotate armature in proper direction until interrupter points are just about to open.
6. In this position mesh gears and lock magneto to base.
7. At this point verify the setting by advancing the spark, if points are right they will open.
8. Notice what point in distributor the rotor is touching, this connects with No. 1 cylinder.
9. Wire distributor in firing order of engine, remembering that the distributor always rotates in the opposite direction to that of the armature.

It has been found in practice that with an ordinary four cylinder, four cycle engine running at a speed of 125 R. P. M., the spark may be advanced 1/10 inch while with a speed of 1,500 R. P. M. it may be advanced 1.2 inch of piston stroke.

More power is obtained by two spark plugs firing simultaneously in the same cylinder on opposite sides than with one spark plug as the compressed mixture of air and gas is ignited at two different points at the same time and consequently less time is required for the flame to ignite the entire charge.

There is an advantage in using spark plugs with more than one spark jumping point so that if one point gets sooted up the others may be in better condition and the cylinder will not miss fire. Such a plug is illustrated at B in Fig. 3.

Motor Dynamo.

A motor dynamo as used in automobile lighting and starting systems is a generator and motor combined on one shaft with separate windings for each purpose. Two field windings are used, one a series winding for starting motor purposes and the other a shunt winding for the generation of current. Sometimes an additional winding

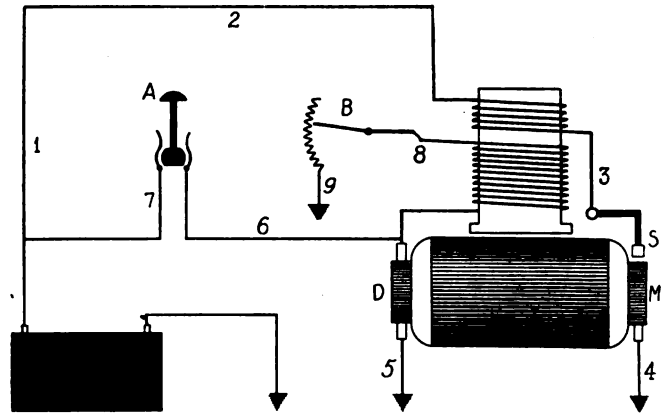


Fig. 6—Circuit Diagram of Typical Motor-Generator.

is used for regulation of the dynamo output. In this case there will be three windings. The field magnets will have a shunt winding for generation, a heavy series winding for starting purposes and a reversed series winding for output regulation.

Another system uses a third field winding for regulation purposes but not the reverse series method. One particular system uses a compensating coil on one of the field magnet poles, this coil being energized through the current drawn off the commutator by a regulating brush. This coil assists the shunt windings at low speed, but opposes them at high speeds by the reversal of the current through the regulating brushes.

Another class of motor dynamos uses a shunt and series field winding and also provides separate windings and two

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separate commutators for the armature. The connections are shown in Fig. 6. With the engine idle the open cut-out switch disconnects the battery from the brushes on the dynamo commutator D and also from the lower shunt field. The dynamo or current generating part of the unit is therefore inoperative. When the starting switch S is closed current flows from the battery through the wires 1 and 2 to the upper series field and then through the wire 3 to the brush resting on the motor commutator M. Passing through the motor windings on the armature, the current returns to the battery through the wire 4 and the engine is started.

With the engine started, the switch S is allowed to open and the series field and motor windings on the armature are no longer energized. The motor dynamo is then driven by the engine as a dynamo and with the cutout switch closed, current flows from the dynamo commutator D through the brushes and wires 5, 6 and 7 to the battery for charging. The shunt field is connected to the dynamo commutator brushes and the flow through the field windings is controlled by the regulator. The shunt field current passes from the upper brush through the field windings, then through wire 8 to the regulator and back through wire 9 to the lower dynamo brush.

Automobile Body Painting and Refinishing

Many Second Hand Automobiles Will Be Exchanged This Season and the New Owners Will Probably Want the Car Bodies Refinished

BY ROBERT W. SMITH

I WANT to give in this article an account of some methods employed in England in the painting of automobile bodies. A part of the information that I shall give relates particularly to methods of securing uniformity of results where the body is partly of wood and partly of metal. But this is by no means all. We can often learn much from those who have the same problems and yet have attacked them in a different way. To the readers of this article it is suggested that they read with an open mind. They may find some very useful things that will fit in with what they are already doing. I am indebted to an account by Mr. Charles E. Oliver for my main points.

In English practice, there appear to be three leading methods of treating automobile bodies. These may be summed up as follows:

1. Painting and varnishing.
2. Finishing with enamel.
3. Combining enamel and varnish.

The first method is not greatly different from good practice in coach painting. There are 21 operations beginning with the priming and closing with a finishing coat of varnish.

The second method is carried out in 10 operations. These are:

1. Priming.
2. Stopping.
3. Knife filling with enamel paste.
4. Brush filling with thin enamel paste.
5. Checking coat. (This may be omitted.)
6. Rubbing down.
7. Ground coat of flat enamel.
8. Half gloss enamel.
9. Finishing coat of gloss enamel.
10. Lining and picking up in enamel colors.

It is understood that about 18 days are required for the first method, but that a week is sufficient for the second. "If we follow the second method through, however, we shall find that it is giving most excellent results, and is made possible by a careful study of the materials used and the method of their application. * * * It must also be remembered that the less material of a hard non-elastic nature is used on motor car work the better. The resultant problem is [to find out] what is absolutely necessary to produce a good surface and no more."

Combination of Wood and Metal.

The first item in the enamel process relates to priming. Where there is a combination of wood and metal surfaces in the automobile body it is not an easy matter to get the same final effects on the one material as on the other. There is apt to be a difference in results with the two materials. However, a method has been worked out in accordance with which, it is understood, uniformity of appearance may be secured. It is a question of giving the surfaces a preliminary treatment before applying any priming. First, a drying oil is made ready. Following is the recipe for it:

Linseed oil	2 parts
Gold size	1 part
Turpentine	1 part

When these ingredients have been thoroughly mixed, the liquid may be applied to the body of the automobile. Plenty of it is to be used, particularly with the wood. The object in view in the latter case is to give the wood all it will take. Before either surface has dried off, a scouring operation is carried out by means of a block of wood with a flat surface on which a cover of glass-paper has been arranged. Finally, a cotton rag or an equivalent is used to wipe off the surfaces. In the course of half

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a day or thereabouts, it will be found that the wood and the metal surfaces have much the same appearance and that the *same priming* may be used indifferently over both materials of the body. The recipe for the priming coat is as follows:

Tub lead.
Lamp black (pure).

These are to be mixed with a thinner made by using equal parts of linseed oil, gold size and turpentine.

Instead of the preliminary drying oil used in the foregoing, we may substitute a double procedure. First, we use a very oily primer for the wood surface. We allow this to stand over night; and then apply a sharper coat over the entire surface of wood and metal. Another procedure "is the use of a coat of thin shellac, knotting direct upon the wood, followed by the coat of priming over all. The chief recommendation of this method is the speed with which the paint dries and can be followed up.

As to the knife filling mentioned as Item No. 3 in the enamel method, it will be perhaps unnecessary to say anything, as it is a procedure possibly better known in America than in England.

Rubbing down may advantageously be done by using fine pumice stone and finishing with cuttlefish stone.

We come now to the sharp diversions between the older paint and varnish method and the modern enamel process. In the older procedure, a great many coats of lead paint follow one another. It seems that the smoothing effect of the rubbing down with the stone is more or less nullified by the next coat of paint, so that it becomes necessary to rub down and paint, rub down and paint, for quite a number of operations. With the enamel method, pretty much all of this slow advance by contrary treatments is cut off at a clip.

Surface Smooth to Start.

We now assume that a smooth, flat surface has been secured. With the enamel process we have only four more operations; whereas with the paint and varnish procedure there would still be nine. We now put on our ground coat of enamel with a fine brush. There will be a better surface than with the lead, so that we will not have to rub down with any kind of stone or the like, except to a rather small amount. We may, here and there, have to treat spots with cuttlefish bone, and we may have to go over the second enamel coat. Furthermore, we are putting on twice as much body of color as we would with a lead coat. Note well, however, that, whatever the final tint or shade desired, precisely that tint or shade is to be put on now with the ground coat.

The next operation is the application of what is called a half gloss coat of enamel. We prepare the enamel by mixing the flat enamel used for the ground coat with the finishing gloss enamel which is to come next. The mixture is properly made by the following formula:

Flat enamel ..... 2 parts
Gloss enamel ..... 1 part

A fine brush is to be used. "There is much diversity of opinion as to what really constitutes the brush most suitable for this purpose. My own view is that the American style of fitch hair-brush, used for 'presto,' is the best. This is an important question, as your decision makes or mars the job. If these coats are applied in the right way, the labor of rubbing down is reduced to the absolute minimum, and the level surface left by the rubbing stone is retained."

Pumice powder and water are now applied in a "flatting down" procedure. Cuttlefish bone may be needed occasionally. The flatting down process has now the advantage of being applied to two heavy coats of color. Further, there is yet another heavy coat to be put on. This will correct slight deviations from standard. "Thus the operation of flatting down is not particularly delicate. Perhaps the most important aspect is the removal of all traces of pumice from the surface by repeated washings. * * * There is just one point to note in connection with this process of painting. It will be observed that the laborious work has been largely eliminated. The preparation, perhaps, calls for more care and a little more skill than the older methods." In effect, it requires more brains but less muscle. Let the painter do the flatting down himself and not let an inexperienced laborer do it. It lasts only a moderate time and is not to be compared to the rubbings down of the old procedure.

We come now to the finishing coat of enamel. It is understood that it requires much more skill than varnishing. "To the beginner it is more difficult than varnish. After a little use, it becomes easier. There is not the same difficulty in obtaining a solid finish. The tops of panels are as solid in color as the middles.

The most difficult feature to the painter unaccustomed to enamels is their heavier nature and stronger body than the varnish with which he is familiar. He commences by working too much surface in one operation. The less enamel is crossed and worried the better will be the result. Large panels should not be laid in all over before laying off. A double brush width should be laid in vertically, starting at the right hand side. This should be crossed once only, and immediately laid off firmly up and down, and left alone. The next width should be laid in the same way and crossed into and not out of the first stretch. This is done in order to avoid any marks of the brush end. Lay off up and down and leave alone. By this method it matters not how big the panels—and panels of fair size are used on the modern motor car. One man can keep them going without any trouble.

Vertical Application Best.

There is a warning to be heeded, in connection with the application of this final gloss coat of enamel. Vertical handling of varnish is better than horizontal. This is true of enamel—only to a more decided degree. Thus, it may be permissible with varnish, when flowing it vertically up to a horizontal molding, to give a single horizontal stroke with the brush just under the molding. But with enamel, this is not permissible. The finishing

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stroke must be a vertical—a light, down-going stroke is the thing.

Lining and picking up constitute the final operation. It is carried out with enamel colors. "This presents no great difficulty to a man used to lining, though at first he may feel somewhat strange with the heavier material and in view of the necessity of applying it to a shiny ground. A little practice will soon overcome these points."

We have had before us the old paint and varnish method and in some detail modern British practice in enamel painting. Let us now give a little attention to what may be called a third procedure. It has usually been thought superfluous to gild the lily. But that is just what this third method proposes to do. In short, the second method is pursued to the end or nearly to the end, and then the gloss enamel is covered with a finishing coat of varnish. "To the coach painter who has never tried it, the result of a coat of good varnish upon a fine enamel surface is a revelation; and I would invite any who are wedded to the varnish finish to try the experiment of painting one panel in delicate or difficult color, and enamel a second panel in the same color, and then varnish them both with the same varnish. When quite dry, examine them in a strong light, and the superiority of the varnish-enamel will be at once revealed." Apparently, then, whenever we want just about the finest finish and effect obtainable, we enamel first and then varnish. In carrying out this program in actual practice, we may or may not omit the lining and picking up until we have flatted down the final gloss coat of enamel. After the flatting down is over, we do the lining and picking up, if not already done, and apply our coat of varnish.

Joining and Adjusting Repair Shop and Garage Machinery Belting

2.—The Use of Guide Wheels, Figuring Pulley Speeds and General Driving Belt Installation, Should Be Understood Thoroughly by Every Garage and Repair Man

BY J. F. SPRINGER

IF the two pulleys are not too close together, no additional means will be required on the tight side to keep the belt running true. A guide wheel, however, may be needed on the slack side to prevent the belt from slipping from the pulleys.

In arranging for two pulleys, at right angles, as in the foregoing, be sure that the belt face of the rims of both pulleys is crowned. That is, see that the pulley diameter is at a maximum along the center line of the face and diminishes gradually to both edges. It is usual to curve the surface. This coning of the face of the rim is very similar to what is done when finishing the surface of a roadway in order to provide for drainage to both sides. The amount of crowning varies somewhat in practice. An average amount is about one per cent of the width of the rim face; see Fig. 4. Thus, for a four-inch face pulley, the center would be 0.04 inch higher than the sides. The maximum diameter would be twice this amount, or 0.08 inch, greater than either of the two minimum diameters. Some pulleys will be crowned a little more than this; others, less. Crowning is necessary to keep the belt on the pulley. A belt will tend to run where the stress is greatest. The crowning locates the greatest tension at the center of the face of the rim, because there the belt is stretched the most.

Crossed belts will be found useful, sometimes, in providing a simple means of reversing a turning-lathe. The crossed belt may then be arranged between counter shaft and the head stock of the lathe.

It will be understood that the length best for an open belt will not be the best for a crossed or quarter-twisted belt, even if it happens that the same belt can be put on the variously arranged pulleys. To get the proper lengths, use the tape line, putting it on the pulleys just as the belt is to be used and then deducting the proper percentages already given for open belts, in order to allow for tension.

Different Pulley Speeds.

Sometimes it is desirable to get a higher speed of rotation or a higher surface speed from a machine than the ordinary arrangements permit. For example it may be desired to operate a grinding attachment in connection with a lathe, the spindle of the lathe providing the means for turning the work and some special counter-shaft arrangements being used to drive the grinding spindle. There should be no trouble about getting the proper speed from the lathe spindle. The trouble centers on the spindle carrying the grinding wheel.

In order to do grinding advantageously, it is practically necessary to rotate the grinding wheel at such rate that the edge which does the grinding shall be moving at the rate of 60 miles an hour or faster. Approximately 6,000 feet per minute may be regarded as representative of the best American practice. This speed is not at all easy to get with ordinary arrangements. Consider a moment. Suppose the line shaft is running at 150 r. p. m. and that it is belt-connected to the regular lathe counter-shaft, the arrangements being such that the counter-shaft rotates twice as rapidly—that is, at 300 r. p. m.

Now if the little grinding wheel has a diameter of

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1 15/16 inches, it will have a circumference of just about 6 inches. This is one-half a foot. To get 6,000 feet per minute at the rim of the wheel, it must revolve 12,000 turns of the spindle in the same time. This rotational speed is forty times as fast as that of the counter-shaft, and consequently would require, if it is to be obtained directly from it under present arrangements, that the driving pulley on the counter-shaft should have forty times the diameter of the grinding wheel—that is, 40 × 1 15/16 = 77½ inches, or about 6½ feet. This would

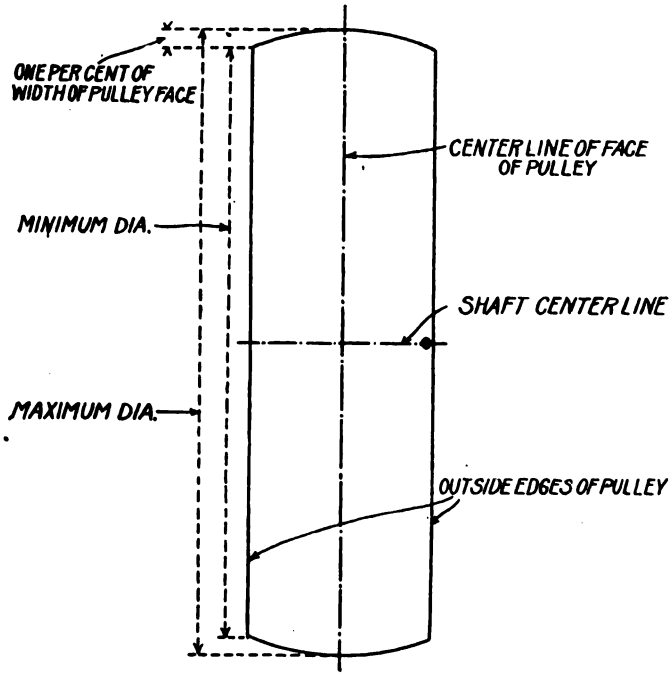


Fig. 4—Illustrating Measurements and Terms Relating to a Crowned Pulley.

be absurd. What is needed is a special counter-shaft. It may be operated from the usual counter-shaft and serves to increase the speed before reaching the grinding spindle.

Altogether forty times the speed of the first counter-shaft is necessary. As forty breaks up readily into the factors eight and five, the two shafts may be connected in such a way as to obtain with number two five times the speed of number one, then to connect number two wtih number three or the grinding shaft so that number three will revolve eight times the speed of number two.

Obviously, then, the pulleys to use on shafts number one and two should be of such diameters that the ratio of the diameters is five to one; and the ratio of the diameters of shafts number two and three is eight to one.

If it is necessary that the grinding shaft or shaft number three, travel at 12,000 r. p. m. the ratio should be made slightly greater, in order to cover possible belt slippage.

Diameters of Pulleys.

In the present case, ignoring slippage, the grinding shaft revolves at 12,000 r. p. m. the counter-shaft number two at 1,500 r. p. m. and shaft number one, or the driver at 300 r. p. m. The several diameters might then be as follows: number one 20 inches; number two driven four inches; number two driver 24 inches and number three driven, or grinding shaft wheel, three inches. If there is a great amount of slippage, or it is necessary to drive the third wheel at 12,000 r. p. m. the latter pulley may be made slightly less than three inches in diameter.

Since any speed above 2,000 r. p. m. is considered high, one should be careful in the construction of the bearings and rotating members. The pulleys should be very carefully balanced and the bearing boxes firmly fastened into place.

Belt Shifters.

The use of a belt shifter is necessary and proper, especially where a shift from a loose pulley to a tight, or the reverse, is to be accomplished overhead. However, not all belt shifters are equally good. There is one type in the long rod or handle which extends down from overhead is to be set to one side or the other of the vertical. This may make trouble. The force of gravity tends to pull the handle to the vertical. This may result in the belt working partly on the tight pulley and partly on the loose one, and a considerable wear and tear on the belt.

There is a simple way of avoiding all such trouble. A device described by R. T. Kent in his book on *Leather Belting* is shown in the accompanying figure; see Fig. 5. The two overhead pulleys are appropriately marked L and T (loose and tight). The long handle which extends down to the vicinity of the workman is shown, but only in its upper part, to the right of the hangers and the pulleys. It may be swung on its pivot to right and left. If shifted to the left, it will bear against the pin B and cause the pin and also the horizontal rod marked A to move to the left. The two fingers, one to the right of A and the other to the left, will carry the belt (not shown) from the tight pulley onto the loose one. This

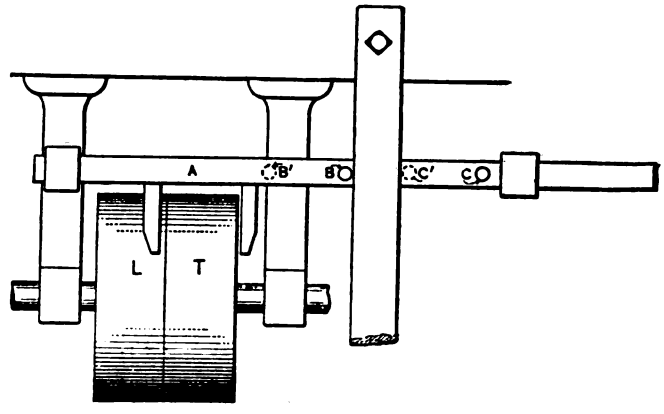


Fig. 5—A Belt Shifter Described by R. T. Kent in Leather Belting.

will bring the pin B to the position Bl. The shifting handle will drop to a vertical position when the band releases it. This will have no effect on the horizontal rod, unless the pin C is wrongly placed. Its function is to afford a means of shifting the horizontal rod back to its original position. But the pin C should be so sit-

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uated that when the shifting rod is moved to the right, the belt will begin to move to the tight pulley T. A proper position for C will be Cl at the moment when the horizontal rod is fully over to the left. The foregoing means that B and C are to be moved the width of one pulley.

We now have enough information to give us the basis for placing the two pins. Arrange the shifting rod exactly vertical, just as in the figure. Then set the horizontal rod to the position where the two fingers which do the actual shifting of the belt are in the position shown in the figure. Then mark the positions B and Cl —one just to the left of the vertical rod and the other just to the right.

Measure from the center of Cl to the right a distance exactly equal to the belt shift. Ordinarily, this should be the horizontal distance from the center of the face T to the center of the face L. We now have the position of the center of C. Bore holes at B and C and insert the pins. The quiescent position of the rod is vertical and not to one side or the other. When the belt is on the tight pulley (as in the figure), the shifting rod will hang vertical with the pin B close on the left. The pin C will be at a distance to the right. After the shift of the belt to the loose pulley, B will be in the position of Bl; and C will be at Cl with the rod hanging vertical alongside. In neither position will the shifting rod tend to move either to right or left, since it is already vertical.

SOME EASY MONEY.

A Marvelously Large Gold Mine Will Soon Be Opened by the Tractor Manufacturers. Everyone Should Try for Their Share.

ALL of us remember what big profits were made in the first part of the twentieth century by automobile agents and salesmen. We doubt if any other business held forth such rosy promises for the future as did that of the automobile. From selling two cars a month many of the agencies grew large enough to dispose of as many thousand a week. State agents simply sat back and collected the money while local agents sold the cars, in many cases without going out of their sales rooms or making a single demonstration.

The days of big profits in automobiles have passed. The public in general, or at least those who can afford to, own cars, and never again will the harvest be as large as it was a few years ago. Intelligent and up-to-date dealers, garage men and even salesmen are beginning to realize that a new market is being opened which holds out more inducements than did that of the automobile. We speak of the truck and tractor trade, particularly the latter.

We feel safe in saying that within a very few months every farmer in the country will be investigating tractors. The Government is recommending the machines. All of the farming societies and granges are investigating it, and some bright morning the automobile dealer will be awakened by the clamor of customers at his door waiting for tractors.

To a certain extent tractors sell themselves. They are a highly necessary piece of the farm equipment. The hired man problem can only be solved by the use of the tractor and not only does the farm tractor make the farmer independent of labor troubles, but it also relieves the farmer of live stock worries. He need not fear that the tractor will pass away with the colic just when he needs it the most. He need not plant one-quarter of his farm in hay to feed the tractor with, for the tractor does not eat.

The tractor is just like a pre-payment gas meter. If you want it to work you furnish it with fuel and you don't have to furnish it with fuel unless you want it to work, whereas a horse requires food whether he is working or not.

Don't be a "back number," familiarize yourself with tractors and the tractor situation and in this way get your share of the commissions which the up-to-date dealers are bound to collect.



Do you know the measure of success which will satisfy you, or are you just drifting along day by day and week by week, reasonably satisfied to have three meals a day, pay your rent, and get nowhere in particular? Do you aim to be the head of the rat or the tail of a mouse? Are you satisfied to have anything short of the biggest business in your line in town? If you are, you better take a spring tonic—one that'll make you feel like a new "woman."

Many Tire Types Discontinued.

One of the things that has been accomplished by the present war, which seems to be fairly acceptable to the automobile trade in general, is the cutting down in the number of types of automobile tires manufactured. At the present time nearly 300 different types of tires are being made. It will almost seem that each motorist had his special type. This means that there is an unnecessary shelving of equipment and stock and the manufacturers are beginning to eliminate many of the types and sizes.

It is claimed that within two years all but nine types and sizes will have been discontinued. This step on the part of the manufacturers has been recommended by the Conservation Division and the War Industries Board.

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MAY THE WORLD BE ILLUMINED BY THE LIGHT OF LIBERTY

Why Should We Use a Capital Letter When Writing an "Improper" Noun Like germany?

IF one were to consult the dictionary he would find that the word capital is defined as being used to convey importance and for this reason we have the rule which tells us to use capital letters for words of importance. Again we have the rule which reads, "All proper nouns should begin with capital letters."

We contend that the word "germany" is of no importance and that it might be termed an "improper noun" rather than a proper noun. It follows therefore that the first letter should never be a capital. Let us reserve our capital letters for words like AMERICA, and not demean them by association with anything relating to the hun.

The kaiser Knows How the Yankees Fight Abroad, Show Him How We Help at Home

ONE hundred and forty-two years ago, our fathers declared themselves free. Upon the Fourth of July, the little country of America was born, and like an oak tree that little country grew until it is, upon its 142nd birthday, one of the biggest in the world.

Our ancestors established the United States of America upon the strong foundation that every man has an equal right with every other man. Many of them laid down their lives to prove that they were right. And it is to those brave men that we owe our present prosperity and freedom.

Eighty-eight years later more brave men had been sacrificed and more property destroyed. Our great nation was in grave danger, but, since the cause of Liberty and Justice was right, the storm spent itself and the sun shone once more. Those brave men killed in the Civil War, like those in the Revolution, were martyrs to the cause of Freedom.

To-day we are attacked by a merciless foe; a vandal who does not respect the laws of humanity, nor recognize the laws of God. Who fails to show mercy toward defenseless women and children and who massacres those helpless heroes who have been disabled by his cannon. A hun, who seems to have a compact with Beelzebub, and whose deeds might well cause Satan himself to hang his head in shame.

Can we countenance such inhuman actions? Has the sacrifice of our brave forefathers been made in vain? Can we attend to our own selfish interests before we staunch the wounds of bleeding France? Can we look our own daughters and wives in the eyes before we have avenged the wronged and helpless women of Belgium? Can we enter our homes and see our own children, without thinking of those youths and babies bayoneted by the barbarous german? Can we break bread at our meals without being choked by the thought of our countrymen starving in German prisons?

NEVER!

America must fight, UNITED we must work together. We must stand behind those brave boys whom we have sent over to France. We must do our part and keep them supplied with food, ammunition and courage. We must prove that even if we cannot fight at least we can help those who do fight. We must show the hun that God is NOT with him; that might is NOT right; that the old law of "survival of only the fittest" has no place in civilization—that WE ARE RIGHT.

We must show the kaiser that he cannot trespass upon the rights of others, that he cannot trample the weak under his feet, nor send a nation into bondage and slavery with impunity.

AMERICA must, and IS going to win the war. America is willing to sacrifice its all rather than be defeated. America and Liberty are synonymous, when Liberty is crushed by the iron fist, then America dies.

AMERICA has never been defeated—because America has always been in the right. Our boys in France ARE GOING TO WIN, because AMERICA IS STILL RIGHT. Stand behind our boys, do your part, they are giving their lives, you must furnish the money. The boys can shoot bullets only; your money will help kill autocracy; FIGHT FOR RIGHT AND FREEDOM.

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Now Is the Time to Save, for the Stream of Easy Money Will Not Flow Forever

WAGES are high—never so high before, and still increasing. Many men are earning three or four times as much as they ever earned before, and too many of them are spending their money lavishly—almost recklessly—as though the flood would keep up forever.

After every freshet there comes a time when the turbulent stream subsides to quite modest proportions, or possibly dries up entirely, save a stagnant pool here and there. We may be sure that the money stream, now at high water mark, will some day subside also.

The moral of all this is that the man who is now earning big wages should save something for the day of drouth which is sure to come.

There is no better or safer way of saving than to buy United States War Thrift Stamps, regularly every week, as pay-day comes around. Don't put it off. Set aside a certain sum each week to invest in this way, and some day you will be glad that we gave you this advice.

A Fourth of July Bonfire in Honor of His Satanic Majesty, the kaiser

DURING the big parade in New York, on July 4th, in the heart of the big city, there was a bonfire in honor of the kaiser. We do not say this in sarcasm—but with the greatest earnestness. The person who furnished the fuel for the fire did his best to help the kaiser in his little way; and was to a certain extent successful. The man who built the fire was an automobile driver who stopped his car for ten minutes at the curb, without stopping the engine.

Now that bonfire was not an actual fire in the sense that it was a burning mass of wood; it was a bonfire of gasoline; a waste of that precious fluid which is so badly needed for our aeroplanes in France.

Every day there are hundreds of car owners who build bonfires for the kaiser; every day someone in this country helps the hun—DON'T HELP build it—help put it out.

There Is Still Time to Protest Against the Increase of Postage

OUR readers are advised that on July 1st the law establishing a system of zone postal rates went into effect, in connection with all periodical publications.

This law provides for eight zones radiating from the place of publication, with progressively higher rates in each zone. These rates will be raised, if the present law stands, each year for three years until increases over the old postage rate have been effected ranging from fifty to nine hundred per cent.

Of course it goes without saying that few periodical publications can stand any such excessive rates of postage, at present subscription rates. Some publications are probably rather disposed to worry along through the first year of the new law in the hope that the Congress to be elected in November next will see the injustice of the new law, and either repeal it or postpone its execution for a period long enough to enable them to make a far more comprehensive investigation of the second class postage question than has ever been made before.

Our candidates for re-election to the House of Representatives next fall, and also the new candidates, are likely to be far more amenable to reason, in connection with postage matters, while the campaign is going on than perhaps they will be after election. The people of this country who do not wish to pay more for their reading matter than they have been paying, should bring to bear upon all candidates the arguments with which, no doubt, most readers are familiar, against any increase in postage over and above the old rate of a cent a pound.

Unless the great reading public takes hold of this matter in earnest, all publications eventually will have to raise their subscription rates very considerably.

It is not too late for our readers who have not already written to the Congressman from their District and the two Senators from their State, to do so at once. They should enter a strong protest against the new law, and insist upon its repeal, or at least a postponement of its execution until after the war.

Is It Wise to Strangle the Industries of the Country by Ceasing to Spend?

THE sub-joined communication, which appeared in the New York Sun, June 22, 1918, written by M. T. R., is worthy of careful consideration by every reader of the Automobile Dealer and Repairer.

"It is necessary for the Government to have money, and a great deal of it, to win the war. If the industries of the country, to a considerable extent, are to be closed up as 'non-essential,' or their output greatly restricted, where is the money coming from to pay war taxes or buy Liberty Bonds?

"If you draw water from a lake continuously and permit little or none to flow into it, it only becomes a question of time when the lake will dry up.

"If you consider the United States a vast lake of money, it is manifest, if the Government keeps drawing it out in the form of war taxes and Liberty Bonds, that the time will come when the supply will run short—unless replenished, and the replenishment must come from the industries of the country in active operation.

"Classify them as 'non-essential,' and close them up, or reduce profits to a nominal point, and there is no big stream of money flowing into the great lake for future taxes and future loans.

"Take the automobile industry as an illustration. If this great business is forced to shut down because denied

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steel and coal by the Government, several hundred thousand men and women will be deprived of the chance to earn a living, and there will be little or nothing in the way of profit to be taxed.

"The wise course would seem to be to keep all possible industries busy earning profits for the use of the Government in winning the war.

"It should be kept carefully in mind that property is not money—the Government doesn't want real estate or personal effects. It wants and must have money. Now, the only way to get it is to permit the industries of the country to go on making goods and selling them.

"The Civil War was a pretty big thing for those days, but there was never any attempt to throttle business, to deprive it of working materials, as seems to be contemplated now.

"There is far more need of keeping our industries going at full speed to-day than there was in Civil War days, because we have got not only to finance ourselves, but to a considerable extent to finance our Allies.

"Instead, therefore, of taking steps to dry up the sources of revenue, people should be encouraged to do all the business they can, and sell all the goods there is a demand for, in order that they may be in a position to pay war taxes and buy bonds. Nobody can pay taxes and buy bonds unless permitted to make profits."

Advertising Is One of the Largest Factors Making for Big Business

IN spite of the fact that Congress has condemned advertising by placing upon it an exorbitant tax, in the form of largely increased rates of postage, it still remains true that advertising is the greatest business building power in the world.

It should never be forgotten that during the discussion of the increased rate of postage on the advertising portion of second class publications, one intellligent Congressman proudly boasted that he had never read an advertisement in his life.

If that Congressman has not been ashamed of this confession, his constituents should be ashamed for him, and next fall leave him at home, to wallow in his ignorance. They should put a man in his place who is endowed with at least a modicum of business sense.

It has more than once happened that a big business has been built up by advertising, and when it was supposed to have acquired momentum enough to run itself, the advertising has been stopped, with the inevitable result that the business secured by advertising gradually dropped to a non-paying basis.

You cannot run a steam engine with the coal that was consumed in the furnace yesterday. You cannot run a business with the advertising done last week, last month, or last year. The public requires to be fed continuously with reasons for buying your product, or it will soon forget you and what you make. The old-fashioned notion that a good thing sells itself, may have worked, perhaps years ago, when there was no such thing as advertising, but it is hopelessly out of date to-day.

In imposing an exorbitant rate of postage on all periodicals, Congress has taken a step calculated to work great injury to the general business of the country. It is to be hoped that the Congressmen whom the people of the country will select next November to represent them will have become so well informed on the necessity for a low rate of postage on second class matter, for the benefit of the reading public, that the present confiscatory law will be repealed.

The Committee on Ways and Means (headed by Mr. Kitchin), gave the publishers several hearings, the latter part of June, but without apparently making the slightest impression upon Mr. Kitchin. He still seems to feel that it is necessary to wreck the publishing business of the country. He does not say that he is doing it because most of the publishing is done north of Mason and Dixon's line, but the impression is very strong that that is the reason for his advocacy of the unjust law which was passed at the last session of Congress. Mr. Kitchin's constituents would do well to subject him to an educational campaign.

The Usefulness of the Audit Bureau of Circulations and Its Importance

THE FOURTH ESTATE, of this city, does not believe in the Audit Bureau of Circulations, and thinks it has outlived its usefulness—if it ever had any. It regards this organization as an insult to the honest publishers of the country. It thinks the publishers should appoint their own auditing committee.

We cannot agree with these views. It is the honest publishers that need this Bureau to protect themselves from the publishers whose statements of circulation never can be relied upon.

We believe the Audit Bureau of Circulations is doing good work, and that it was never more useful than just now. Advertisers are entitled to know what they are getting for their money, and it is safe to say that they would have no confidence in an audit bureau maintained by the publishers themselves.

The Audit Bureau of Circulations is an independent organization, whose aim is to get at bottom facts regarding circulations. We believe they are perfectly fair in their treatment of publishers, and it is safe to say that no publisher with a more or less faked circulation can hope to receive endorsement at their hands. The Fourth Estate should join this organization.

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Trim Your Show Window So That It Will Attract Attention

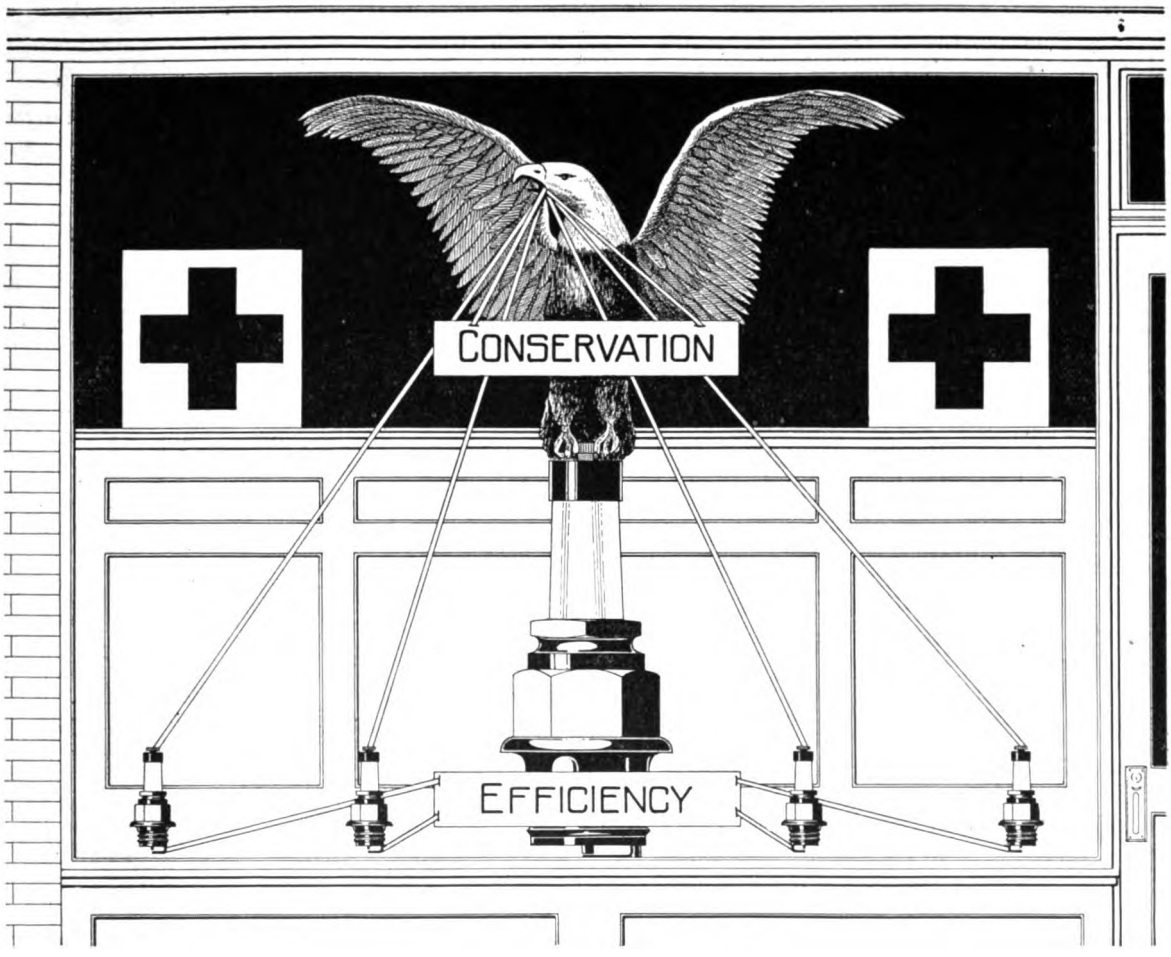
Let Your Window Display Show Such a Patriotic Spirit That Every Person Who Passes Is Attracted To It and Gets the Impression That You, At Least, Are Doing Your Part In Winning the War

THE accessory salesman and dealer of today has one keynote upon which to base his show window exhibits and that is "Conservation." It follows necessarily that every window exhibit should be of a patriotic nature. Every true-hearted American is trying to do his part in saving the necessities of life in order that America may do her part in the war. For this reason the dealers should concentrate upon such accessories or devices, as in their opinion, make for efficiency and thus aid in the fight for conservation.

We all want to do our part to aid in winning the war and doubtless we all wrack our brains daily to find some way in which we can furnish our part of the muscle back of the solar plexus blow which will put the kaiser on his back until the end of the "count." We can all do it by being patriotic. We can each add our part to the enthusiasm which stirs the nation and cheers the boys who cross. Our enthusiasm will be reflected in our business and so our business must be, in itself, patriotic. Our show windows must all be emblems of our patriotic feeling.

What emblem stands for more than the American eagle? The one bird that can fly the highest, that is not afraid to look directly at the sun and is not afraid to attack any sort of an enemy. The American eagle stands for strength and air supremacy, and we surely want America to have both of these attributes.

The eagle illustrated may be cut from a large piece of pasteboard and painted with a brush and black ink. In his beak he carries the play card upon which is printed the war slogan of America, "Conservation," and leading to "conservation" are streamers from "efficiency." In our illustration we have shown spark plugs. A large pasteboard model of the spark plug to be ad-



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vertised is cut out and mounted in the background, and above it and over all, the American eagle towers.

Only a few spark plugs should be shown, and these may be piled in groups upon various small stands at the several points shown in the drawing. Each one of these stands should be camouflaged to represent a spark plug itself. Too many exhibits in the window will only detract from the general appearance. In fact, one plug is enough to give the idea and bring the argument home to the beholder. As a background bunting or Red Cross flags may be used. The latter attract the most attention at the present time. In an early issue of this magazine we will publish an article showing the dealer how he may make use of our window display suggestions and how he may draw large emblems or ornaments himself with practically no practice. Be sure to save this particular page if you have a show window.

COMMENT ON THE ZONE LAW.

What One Well Known Postal Authority Has To Say Regarding the Change in the Second Class Postal Rate.

The following open letter was written to the Publishers' Advisory Board by Charles E. Hughes, who is one of the ablest men in the Republican national councils. The reader will doubtless recall that Mr. Hughes was the head of the Hughes Postal Commission which made a thorough investigation of the Postal Department.

By virtue of the months of painstaking investigation on the part of Mr. Hughes in these postal affairs, he is enabled to speak upon postal matters in condemnation of this destructive postal "zone" law with technical authority and a professional reputation of national recognition. Every subscriber should read Mr. Hughes' letter carefully, follow his arguments, and if convinced of their fairness, write to their congressmen and senators, asking for the prompt repeal of this destructive zone law.—(Editor.)

1262 New Hampshire Ave., Washington, D. C.
June 17, 1918.

Mr. Allen H. Richardson,
Publishers Advisory Board,
200 Fifth Ave., New York.

Dear Sir:

In answer to your letter, I beg to say:

I prefer not to accept a retainer to appear before legislative committees upon matters of general policy, as in such matters, if I have anything to say, I desire to speak only as a citizen.

I have no hesitation in saying that I regard the zone system of postal rates, for newspapers and periodicals, coming under the definition of second-class mail matter, as ill advised. The Commission on Second-Class Mail Matter (appointed in 1911), of which I was a member, considered this question and reported unanimously against the zone system. We said in that report:

> "The policy of zone rates was pursued in the earlier history of our post office and has been given up in favor of a uniform rate in view of the larger interest of the nation as a whole. It would seem to the Commission to be entirely impracticable to attempt to establish a system of zone rates for second-class matter. * * *
>
> "Progress in the post office, with respect both to economy in administration and to public convenience, leads away from a variety of differential charges to uniform rates and broad classifications."

In my judgment the zone system for second-class mail matter is unjust to the publisher and unjust to the public. It not only imposes upon the publisher the additional rates upon a sectional basis, but it makes necessary the added expense for the necessary zone classifications at a time when every economy in production and distribution is most important. It introduces a complicated postal system to the inconvenience of the publisher and public when there should be a constant effort towards greater simplicity. There is no more reason for a zone system of rates for newspapers and magazines than for letters.

Newspapers and magazines are admitted to the second-class postal rates on the well established policy of encouraging the dissemination of intelligence, but a zone system is a barrier to this dissemination. If it is important that newspapers and magazines should be circulated, it is equally important that there should not be sectional divisions to impede their general circulation through the entire country.

We are proud at this moment of our united purpose, but if we are to continue as a people to cherish united purposes and to maintain our essential unity as a nation we must foster the influences that promote unity. The greatest of these influences, perhaps, is the spread of intelligence diffused by newspapers and periodical literature. Abuses in connection with second-class mail matter will not be cured by a zone system of rates. That will hurt the good no less than the bad, and perhaps some of the best sort of periodical literature will be hit the hardest.

We do not wish to promote sectionalism, and "one country" means that in our correspondence and in the diffusion of necessary intelligence we should have a uniform postal rate for the entire country. The widest and freest interchange is the soundest public policy.

I hope that Congress will repeal the provision for the zone system which is decidedly a looking-backward and walking-backward measure.

Very sincerely yours,
(Signed) CHARLES E. HUGHES.

To give better service to a Packard owner than to a Ford owner is to lose the business of the Ford owner, who may be the better customer of the two.

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Farm Tractors Replace Many Men

Every Garageman and Dealer Should Begin to Realize That Man Power on the Farms Should Be Replaced by Machinery and Sell Tractors to the Farmers

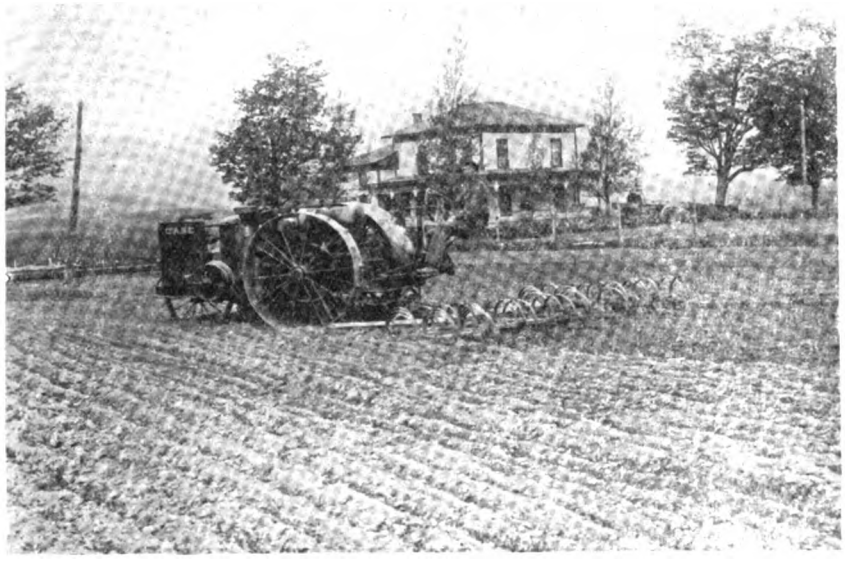
BY W. O. MANN

"BOUGHT the Winters farm, have you?" said Farmer Halkett, his intelligent face lighting up with interest. "Well, I'm glad to hear someone knows a good thing when they see it. A fine farm, that one is. I'd like to have it myself, and maybe I would have taken it if I hadn't gone so strong on machinery and such like for this place. Suppose you'll be putting in a good deal of machinery yourself."

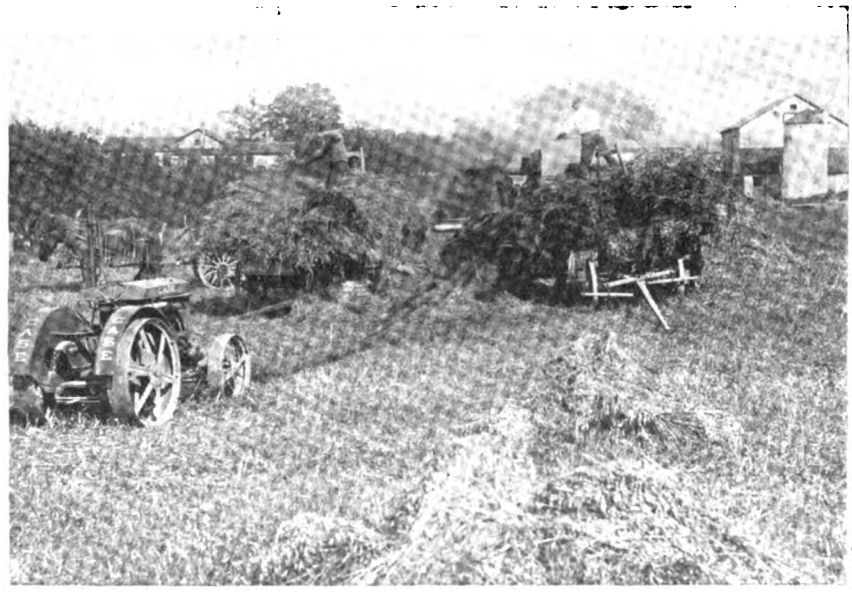
"Well, I've been thinking about that."

Farmer Halkett gazed reflectively at the horizon for a moment and took another look at his new neighbor before replying.

"Maybe it ain't my business to say so," he said slowly. "But if I was you I'd figure on running that place as much as you can by machinery or quitting before you start. Maybe you know where you can get plenty of help"—the newcomer shook his head—"but I don't. Unless you calculate to raise just a few little crops for the good of your health there's no use taking up farming round here doing your work with men and horses. The horse situation ain't so bad as it is in some localities, though it ain't what it used to be, but you can't get a man round here that can do a boy's work even and at that, there's so many wanting them that you can't depend



At the Left Is Shown the Case Model 10-20 Tractor, Doing the Work of Two Horses, Hauling a Spring Harrow in Heavy Soil. Such a Machine Is Often Used to Advantage in Performing Two Operations at One Time; Gang Plows Are Used and the Harrow Hitched on Behind. The Scope of the Tractor Is Almost Unlimited, It Replaces Many Horses, Is Tireless, and Eats Nothing Except When Used.



At the Right Is Illustrated a Case 9-18 Model B Tractor, Being Used for Thrashing. This Valuable Machine Helped Plow the Ground, Harrow It, Spread the Fertilizer, and Finally, When the Crop Was Ready to Harvest, Drew the Mowing Machine, Hauled It to the Thrasher, Where Its Power Drove That Machine. It Might Easily Be Used Throughout the Whole Year.

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on 'em from one day to another. I've got a pretty sizeable little place here and I know everyone hereabouts and I'm willing to pay as much as anyone, and what men there is would as soon work for me as the next one. But I got my dose and I'm betting every dollar, cash and credit, on machinery farming.

"Yes, I've got a good three-plow tractor and even if horses and men was plenty I wouldn't go back. When I bought it the tractor people told me a good many things that I didn't swallow without a good deal of chewing. They told me if I did this and that, the machine would run from now till doomsday for the price of shoeing a couple of horses, and that I could run on gasoline or kerosene, and that I could plow ten acres in ten hours in any kind of soil, and a lot more.

"Well, says I to myself, I've been running a car for four years and I know a little bit about some things, and I counted a good deal on the tractor people being just a leetle mite too enthusiastic. You've got to take care of the machine, but you get it all back. It ain't in a machine to work all day at full power and then be satisfied with being left out in the rain without being looked over or considered at all. If it is any good it'll go the next day and the next, maybe; but the day when it won't go will come sooner than if you give it shelter and look things over before starting in again.

"I've got land here that old Betsy won't plow no ten acres of in a day, whatever the tractor people said. But I've got land that she will, and I've done it, too. Let me tell you that's darn good working. You put horses on that and they'll take three or four days to do it. The tractor'll make 2½ miles an hour with three plows where a team'll make less'n two—a good deal less—with one bottom.

"Then you've got to consider your feed. You feed your tractor with stuff that comes in bar'ls, but you've got to feed your horses with what you grow on your own land, and maybe you know how much land it takes to feed a horse! No? Well, on a hundred-acre farm all worked by horses you can just nick out twenty good acres to feed the animals. What do you think of that, neighbor? Oh, yes, maybe the gas and oil and repairs and things'll cost as much as the feed you raise on them twenty acres, but there's several things to think about right there. First off you can raise crops that'll bring a sight more'n feed's worth from them twenty acres, and that's enough to settle the whole question. Then there's no trouble getting good prices for good horses, and that goes toward paying for the tractor and other machinery. And then your wages ain't nearly so high at the end of the week. Oh, I tell you that labor question is a peach! 'Course you can't run a tractor without a man, but you can't work horses enough to do the tractor's share of work without a heap more men, and the more men you have these days the more trouble you have, and that's gospel truth.

"Another thing I hadn't much faith in was this here business of running with kerosene. Henry Alloways over on the other side of the mountain got a tractor that they told him 'd run on kerosene, and it done it all right too. Run for a week steady and Henry was the tickledest man in the country when he figured up what he'd saved. But the machine began to act queer, and it got tired and wouldn't pull her three bottoms through the bad spots without coaxing, and finally she just naturally quit. Henry learned a lot right then, and I helped him so I learned something too. The cylinder head, all in one piece, come off nice and easy, and, by gosh, I wish you'd seen the mess inside. Everything was so stuck up with carbon that it was a holy sight. And a funny thing was that there was more oil in the crankcase than Henry'd ever put in, but it was thin and weak-looking. We didn't know then, but we found out since that the kerosene had a smart little trick of workin' down past the pistons into the bottom and mixing the oil, where it didn't do no good at all. I guess a little more and everything that had ought to be oiled would have been chawed to pieces.

"I had a talk with a tractor man that knew I wasn't at all hopeful as a customer, and he told me that tractors that'll burn kerosene is as plentiful as blackberries, but tractors that'll burn it all up, and leave no carbon, and not spoil the oil, and keep on doing that, are almost as scarce as applejack at a tea-meetin', and that's going some. There's a few, he says, but dang few. I don't know whether my machine'll do it or not, in spite of the earnestness of the people I bought it from, who don't mean any harm, I guess, but just take someone's word for it. But I'm just as sharp to save as any other man, and I've tried mixing kerosene with my gas and watching for bad effects. I'm using fifty-fifty now, and I can't see but what she works as good as on virgin gas. There's just a little mite more carbon, but not enough to count or to do any harm in one season, and I can't see any difference in the oil in the crankcase. But I'm not going to go any further just yet. I believe my old Betsy would be just what Henry's machine done on straight coal-oil.

"This night-work stunt ain't so bad, neighbor. I see they're fixin' up tractors now with electric lights and all that, and I guess it's a good stunt if they can make the fixins so's they'll stand the pounding of farm work. There's none on mine, but I tried night work just the same. On Beeman's place next to mine they lost two horses and couldn't get any more in time, and two of his men went off to Portville one Saturday night and got soused and started to do up the town. That got 'em thirty days each and Beeman nearly went crazy. So I fixed up to plow his land nights, making two days out of one. I took one of the acetylene headlights off my car and put it and the gas tank on the tractor, and we made a real good job. It surprised me a little that after we got used to it we could do as much work in a night as we could in a day. My son Tom and I took turns, each working half the night and sleeping the other half. It wasn't much fun, but I figured that it was worth

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while because Beeman's a good fellow and it saved him from an out-and-out losing season, maybe, and anyway he paid me a fair price and was mighty glad to do it. He considers himself beholden to me, and he's in line for some tractor man to work on, I guess. Ought to be, anyhow.

"Well, if you're interested come over some evening and we'll talk over it some more. I could talk straight on without stoppin' if I didn't have something else to do. Maybe I can save you from some experience.

"Say, neighbor, if you're going to be in the city you might do me a favor. Just inquire round a little and see if there's anything to be had in the way of a little motor plow for truck garden work—one of them machines that we used to hear so much about that'd do the work of one horse. I don't hear anything about 'em any more, and I did think there was a good deal in 'em, if they ever got 'em just right. I asked the man that sold me my tractor, but he said they hadn't worked out well and there was no use bothering with them. That don't sound reasonable to me, and I know farmers that would buy 'em quick if they was all right and not too high. If it's no trouble, just ask about it and let me know sometime —oh, any time at all. Good day."

The Gigantic Exhibition in Chicago

A Show of Tractors and Trucks That Bids Fair To Eclipse By Far Anything of Its Kind Ever Staged Before, in the World

DURING the week of September 14th to 21st, upon the Municipal Pier at Chicago, Ill., will be staged one of the greatest shows in the world. We speak of the Second Annual Exhibit of Trucks, Tractors and Accessories, directed by the Automotive and Accessories Exposition, Inc. All of the farmers of the Middle West are looking forward with great interest to this exhibit, for the very reason that they will be able to inspect and make comparisons of the many forms of trucks and tractors which are now being sold.

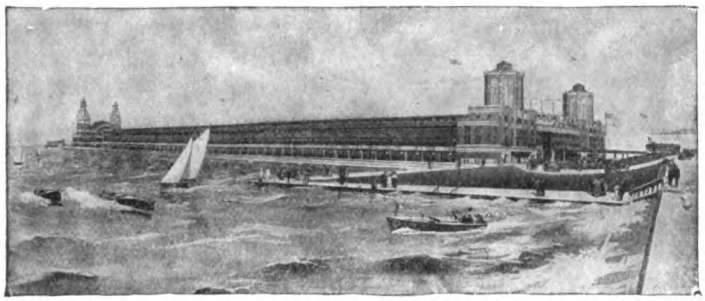
Never before has there been such a collection of tractors as there will be at this exhibit. The space devoted to tractor exhibits is approximately 42,000 sq. ft., while an equal allotment of space is made for truck exhibits. These two machines are keynotes to the nation's salvation in food production and distribution. Never before in the history of the world has there been such a call for conservation, and so the interest in trucks and tractors will be very intense at this time. There are more exhibitors already signed up for this great exposition than the total number at the 1917 show which was held in the Coliseum, yet there are still two



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months left before the show opens. It is also interesting to note that the space already contracted for is much greater than the total floor space of the Coliseum.

The first and second days, Saturday and Sunday, will



The Municipal Pier at Chicago.

be "curiosity seeker days." Monday and Tuesday the hardware men of the country will attend a conference, because hardware dealers everywhere are getting in line to handle automobile accessories and fittings for trucks and tractors. Some of them already have agencies for this type of machinery, others carry these lines along with their regular lines of hardware.

Wednesday will be Illinois day, when farmers from that state will have the right of way to all parts of the magnificent pier except to quarters of the U. S. Navy Training School for Ensigns. Thursday and Friday the thresher men of Illinois, Wisconsin, Iowa, Indiana and Ohio will hold a convention in the auditorium nearly a mile from the shore as interests of the exposition committee.

The space devoted to the Motor Vehicle Publishing Company is 9-A and our representative will be very glad to greet our friends and subscribers at this booth.

The various illustrations herewith show the tremendous amount of floor space as well as the appearance of the pier itself. The pier is divided into two sections. At one side is provided an enclosed parking space large enough to house 1,200 automobiles. At the west end of the pier is the tractor section. The middle section is devoted to truck exhibits and the east end to display of accessories. The first two exhibits are divided by a single aisle through the middle, while the accessories are shown in four rows of booths, two at the center and one at each side separated by two aisles. One may walk from one end of the pier to the other and be able to see every exhibit without walking back and forth.

Do you give yourself a reasonable time for relaxation —the kind of relaxation which is really recreation— which will send you back to your work more eager for it and more fit to accomplish bigger things? Take your wife along with you, and your boys and girls if you have any old enough to enjoy good music, an amusing picture or an inspiring play. Don't get to be so hide-bound that all you can see is dollars and cents, and ledgers and day books, and profit and loss!

STRAIGHTENING A HACK SAW.

Some Machinists Say That a Hacksaw Cannot Be Straightened, But It Can Be, With a Little Care and Patience.

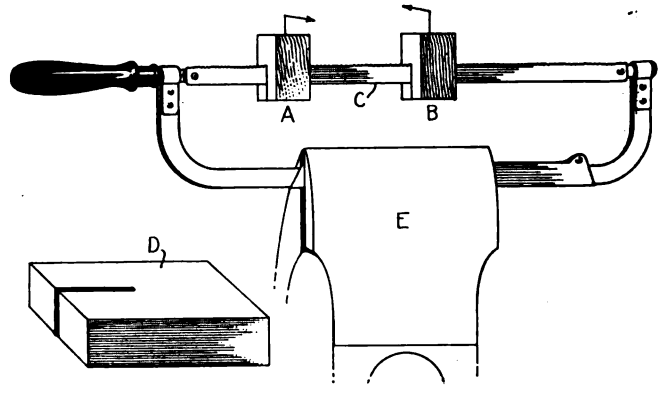
A METAL cutting or hack saw as it is usually termed is made of the best and hardest steel obtainable. The teeth are glass hard and will break if hammered in the least. The body of the saw, back of the teeth, is not so brittle, in many cases, as the teeth and the saw may be "kinked" by carelessness.

To many repairmen, a kinked hacksaw really means a broken one, for they had rather throw the blade into the scrap pile than to repair it. In the days when hacksaw blades were expensive, the machinist used the utmost care when cutting with the saw in order to prevent kinking or saw breakage.

Once a saw is bent, it is useless for it will stick in the metal or snap into pieces; then again, one cannot cut upon a straight line with a bent saw blade, even if the blade is still usable.

Where the bend is long, the blade can be straightened with the fingers, that is, if one is careful not to put too much strain upon it at once. But if the saw is kinked, the finger method means a broken blade and so herewith is shown an easy method.

Prepare two pieces of hardwood as shown at D by cutting slits in one end with a new hacksaw blade of the same thickness as the one to be repaired. Place these over the bent blade as shown at A and B and clamp the saw holder into the vise as shown at E. Be sure that the blade C is drawn as tightly as possible in the frame.



Illustrating Method of Straightening Hack Saw Blades.

By moving the two blocks back and forth on the blade, small kinks will be straightened.

If the kinks are deep, the blocks should be brought together upon each side of the bend and by working the blocks back and forth, with a slight twist each time, the blade will be gradually straightened. Patience is necessary, above all other things, or the saw will be broken. Straighten the saw a little at a time without trying to remove the bend all at once.

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Two Ideas for the Owner or Repair Man

If You Are a Car Owner, You Should Have These Two Tools, and If You Are a Repair Man They Are Indispensable, Because They Will Save Time and Money

VALVES and compression are two items that go hand in hand, when one falls the other goes down also and the engine begins to burn a hole in the pocketbook of the owner. Not long ago I dropped into a garage where the repairmen followed the old Southern custom and "guessed so" when repair work was to be done. I watched one of the mechanics interview a proud Ford car owner who was not satisfied with the car mileage and who did not care to take his exercise mornings in the shape of cranking the engine for half an hour.

The repairman reached over to the throttle and opened it wide until the engine figuratively "ran a race with itself and came out ahead"; then he shut off the throttle entirely until the engine sputtered along on two cylinders. After ten minutes of this sort of "testing" the engine was stopped and the mechanic resorted to the hand-crank, lifting the engine over each compression stroke in order until he had tried all of the cylinders.

"Compression," said the mechanic briefly, then, in order not to appear too certain, he said, "I guess your trouble is in the second and third cylinders; they don't seem to have as much compression as the other two."

I "Guess" He Was Right.

What an intelligent mechanic that repairman was; he had raced the engine and worked upon it ten whole minutes and then only "guessed" what the trouble "might" be. He didn't know what the trouble really was, until he had pulled the engine all down, then he found that his "guess" was correct.

Suppose that you were troubled with a pain in your abdomen and consulted a physician. After listening to your symptoms the doctor might say: "I guess you have appendicitis, but we will have to operate before we can be sure." I doubt very much that you would let that particular doctor perform the operation, before you were sure of the diagnosis. Also I doubt if any doctor would make a diagnosis without using mechanical means to verify the trouble. And so it should be with the repairman, he should "guess" at nothing and should provide himself with suitable tools and instruments.

A Compression Indicator.

The compression in an engine can be measured, much the same as the pressure in a tire or an air tank, in pounds per square inch. Compression varies in different engines; it should not be less than 40 pounds per square inch and is seldom over 125 pounds per square inch. Each car has a normal pressure point, just as the human body has a normal blood pressure point, and the owner should find out just what this pressure should be in his car.

Obtain a pressure gauge, most any sort of a gauge will do if it is calibrated high enough to indicate the highest pressure in the particular engine to be tested. The one shown in the diagram herewith indicates to 200 pounds and is large enough for any engine. A gauge from an old air tank, a Prest-o-Lite gas tank, or a tire gauge will do.

After having removed the porcelain from an old spark plug, have the packing retaining nut B threaded for the gauge, then screw the nut B back into the base of the spark plug C. Put a wooden plug into the nut B, in place of the gauge, and after having cleaned the inside of the plug and nut with a file, smear it over with a soldering paste or acid. Then fill the plug with soft solder as shown at D.

This solder prevents any air leakage past the nut B. Bore the hole through the center of the solder and after removing the wood plug insert the gauge, being sure to screw it into the nut tightly. The compression can then be tested by removing a spark plug and inserting the device in place of it.

A Second Method.

The question might come up, "I can't obtain a gauge such as shown without paying out considerable money." No, you can't now, but you may be able to obtain a second-hand steam gauge. But if you only have a tire gauge of the vertical kind that will indicate up to 100 pounds pressure, don't despair. You can use this just as well as a round one.

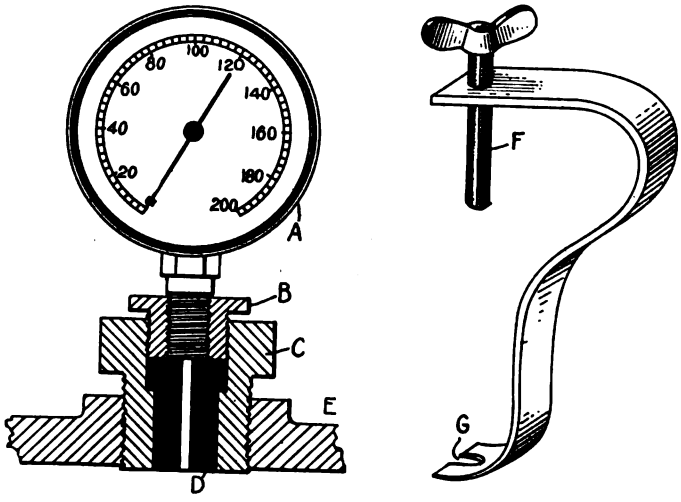
In place of the gauge shown in our drawing, place a tire valve. Cut the valve off close to the bottom and remove the insides. You can put it into the old spark plug and pour the melted solder around it, if you don't want to have the nut B threaded inside. Any time you want to use the device, screw the tire gauge upon the tire valve and put the whole into the spark plug hole. Next time you take your car to the garage, show the garageman this article and ask him how he tests compression.

A Handy Valve Tool.

On the market at the present time there are, perhaps, some hundreds of different kinds of valve tools; some of them are so small that they fall through the holes in the bottom of the tool-kit; others so large that they can

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be used only in conjunction with a block and tackle or by a muscular man. Some of the devices will do anything but repair the engine, others will do nothing except lift the springs, and though the one illustrated herewith falls into the latter class, it is well worth considering if one owns a Packard, a King, or other V type engine.



Two Handy Devices for the Car Owner or the Garage Man.

Some V type engine valves are hard to reach and the ordinary lever type of spring lifter cannot be put into place without removing all of the engine fittings, a waste of time.

The second figure of the illustration herewith gives one an idea as to how a valve lifter may be made that will conform to the shape of the valve side of the engine block. Only a piece of strap iron and a long bolt fitted with a wing nut are necessary. The strap iron should be about one inch in width, 3/16 of an inch in thickness, and long enough to loop about one inch above the top of the engine block. The end G should be forged down to a point so that it can be slipped beneath a spring easily.

With this device, one need not remove the intake or exhaust manifolds, and all of the valves may be removed very quickly. If work is being done on one valve only, the device may be left in place, compressing the spring, and the valve returned as soon as it is repaired.

PROPER LUBRICATION.

A Mixture of Graphite and Grease Is Often a Better Lubricant Than Plain Grease.

TO the motorist who realizes that twenty-five per cent. of the power delivered by his engine is lost in friction, the question of lubrication is one of paramount importance. Grease cups are gone over, oil reservoirs are watched carefully, bearings are inspected regularly and frequently cleaned.

Care in the selection of lubricants is important to him, too, as he realizes that each bearing, gear or spring requires its particular kind of lubricant. Engineers who are experts in the line of automobile lubrication point out that plain oils and greases squeeze out under great pressure and heat. When flake graphite is mixed in, however, the oil or grease serves as a vehicle to carry the graphite to all parts of the bearing or part to be lubricated. The flakes of graphite adhere to the surface, fill all the minute irregularities and form a tough, durable film which prevents metallic contact. The graphite does not squeeze out.

A MOUNTAIN OF RUBBER.

How the Loyal Residents of Cincinnati Hit the kaiser With a Mountain Made of Rubber Junk.

Members of the Cincinnati Automobile Dealers Association developed a successful project in connection with the recent Red Cross drive by appealing to all citizens to dump their old tires, inner tubes and other rubber accessories on Fountain Square to build "Mt. Rubber." The response was generous, as will be seen by the accompanying photograph of "Mt. Rubber."

The picture shows H. K. Shockley, general manager of the Cincinnati Automobile Dealers Association on the pyramid. Equally generous was the bidding for the old rubber, more than $2,000 being realized, all of which



The Mountain of Rubber.

was turned over to the Red Cross Fund by W. G. Welbon, treasurer of the Cincinnati Automobile Dealers Association. One of the unusual contributions to the dealers' collection was a truck, which the owner presented in its entirety because he "could not get off the tires." It brought $5 in the sale.

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Thrust Washers for a Ford.

2465

From R. G. Kimball, New Hampshire.—Kindly advise me by mail how I may overcome any possible trouble I may have due to the change I have made as stated below. I have changed my gear ratio from 3.7 to 1, to 2¾ to 1 (Ford car), and had to turn down one thrust washer to about half its original size due to having a larger pinion gear. I find that the thrust washer has worn, causing a grinding noise when turning corners.

I built up the opposite thrust washer to correspond. What I would like to know is if there is any possible way of substituting different washers to overcome the wear. The thrust washer that was turned down is about half its original size. Kindly advise me as soon as possible as I would like to know if there is any danger of stripping my gears running the car as it is.

Reply.—We would advise you to replace the present fibre washer with a single washer made of Tobin bronze. This should be made specially for your car and can be obtained at any small machine shop. In applying or replacing washers in the Ford rear axle, it is always advisable to so arrange the washers that two steel ones do not come together. In every case steel or iron should rust against bronze or fibre. In your case the bronze washer is most necessary or you will have a lot of trouble with the axle. Practically all of your trouble will be eliminated by the use of a singe bronze washer of the required thickness.

Binding Pistons.

2466

From Frank P. Kutschemeuter, Texas.—When the motor in my 1918 Ford is cold the compression is strong and very springy and seems to be the same in all cylinders, when I try it with the crank; but as soon as the engine becomes hot the pistons stick. That is, they don't stick too tightly, but they feel tight and have no more of that nice springy feeling. I am now using light oil instead of medium thinking that that would overcome the tightness, but it doesn't. I have also looked into the cylinders and found the walls slightly oily and smooth. Just how oily the walls should be, I do not know, and would appreciate your answer. The motor seems to lack proper power which I suppose is due to that same tightness, although I get good mileage (about 25 miles per gallon) and believe I could beat this if I could remedy that tightness.

Reply.—The engine is evidently receiving sufficient lubrication or the cylinder walls would appear dry. The walls should be covered with a very even film of oil at all times. Your trouble is probably due to the fact that there is not sufficient clearance between the pistons and the cylinders or because there is not sufficient clearance between the ends of the piston rings.

When the engine is heated the pistons and the rings fully expand. If the clearance is not great enough they will tighten in the cylinders and cause excessive friction. The clearance to be left between the ends of the rings when cold is about .015 of an inch. The diameter of the piston should be .005 of an inch smaller than the bore of the cylinder.

Stripped Differential Gears.

2467

From P. Kliphouse, New Jersey.—I have a Baby Grand Chevrolet 1916. It was running fine, but a few weeks ago it started a grinding sound when running under 20 miles per hour, and this week when I put the lever in reverse, it would not back up and ripped the tread off the right hand rear tire. I have just put in a new bevel gear and the rear end is O. K. The starter will not start the car when it is cold.

Reply.—We would advise you to examine the differential again. Probably when you put in the new bevel gear you made some mistake in assembling the differential and either left a tool or a bolt in the housing.

Adjusting Current Regulator.

2468

From A. F. Sandow, Kansas.—I have a Simms-Huff System on a 1916 Maxwell the generator of which charges too high. It will go up to 30 amperes. Where is the trouble?

Reply.—Your trouble is probably due to the fact that the spring on the regulating device is too strong and requires too much current to break the contact. This device is arranged so that when the current reaches a point from 15 to 20 amperes, the electro magneto draws away the armature and breaks the contact of the direct line and makes contact through a certain amount of resistance. If you find that the charging current after the armature contact has broken in the circuit is 30 amperes, then the reason for your trouble is that the resistance is not great enough. If this is the case we should advise you to send the regulator to the factory for repairs.

A Unique Trouble.

2469

From B. Harrington, Maryland.—We have a Model 37 Hudson four cylinder, which is equipped with a Delco electric system. Every time we use the car the points in the distributor corrode and we have to file same to get the car to run the next day after using. In other words, we have to file the points every morning to start the car, as they get so corroded every time we use it. The points are new and we cannot understand why the trouble

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is caused, so would ask you to be so kind as to give us some information on this so that we may try to remedy the trouble.

Reply.—We doubt if we have ever heard of such a peculiar case as yours and your trouble with the breaker points in a Delco distributor, and we can explain it in but one way.

From your letter-head, we should assume that you are situated near salt water and as you pack oysters, and perhaps other salt water food, your file or emery cloth has been covered with salt water moisture or oyster broth.

Both salt water and the liquid from oysters is very corrosive, and once it gets into the timer it will continue to corrode the points until they are destroyed. We should advise you to remove the breaker box from the machine and soak it over night in kerosene oil. Wipe it off carefully with a cotton cloth. Be sure to do this work away from your packing house or you will have the same trouble all of the time. You must replace the breaker points with new. Do not file with a rusty file. Dress them off only with a clean piece of emery cloth which has not been near your packing house.

If you follow these directions, being careful to keep your hands free from salt water or oyster moisture, you will have no trouble with the breaker points.

NEW AND INTERESTING THINGS IN MOTORDOM

"Yankee" Ratchet Breast Drill.

No matter how much the automobile manufacturer prides himself on the simple disposition of the parts of his car, the compact construction naturally renders many parts difficult of access; while taking down parts of a car's construction to make repairs is one of the bugbears of garage service. Nevertheless, drilling holes under ordinary conditions raises this necessity most frequently. And inasmuch as with today's scarcity of mechanical help, it is important that repair work be done with the utmost dispatch, the tool that gets to the job and does the work most quickly and easily is in biggest demand.

Of the many features in the "Yankee," the double Ratchet is the most unique. It drives the drill on both forward and backward movements of the crank, even the slightest. Thus, there is no idle movement or lost motion.

It is surprising to how many working conditions this highly specialized tool can be adapted. With it the motor mechanic can handle most any drilling job, and it also saves materially in the number of drilling tools required, making his kit less cumbersome and less expensive.

"Yankee" Breast and Hand Drills are made in 14 different sizes and styles from the 10½-inch Hand Drill No. 1530 (which has all five adjustments) to the powerful Breast Drills Nos. 555 and 1555, capable of holding drills up to ½-inch diameter. Manufactured by North Bros. Mfg. Co., Philadelphia.

Jenkins Vulcan Springs.

It is claimed by those who know, that the average spring breakage for all automobiles amounts to one for each car annually. Notwithstanding this high average, however, the car owner does not apprehend spring breakage and when this mishap occurs the car may be put out of commission for a week or more until the proper spring is secured from the factory.

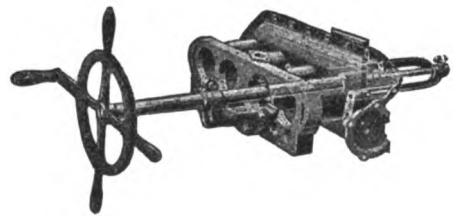
Mr. T. B. Jenkins, President of the Jenkins Vulcan Spring Co., Richmond, Indiana, conceived a new idea some few years ago and put a plan into effect. By this plan dealers and garage owners are furnished an assortment of springs in various sizes and types, duplicates of those used on the most popular cars, and, together with this assortment, a special rack. The manufacturers specialize on service, and advertise extensively that there is a spring in every town for every car. It follows, therefore, that the car owner who knows of this will go to the dealer who handles the Jenkins Springs. Our readers are requested to write the manufacturers for full details of this plan.

Heiser Improved Cylinder Reborer.

The repair man of today realizes that with so many old machines on the market there is a constant call for the reboring of cylinders, but work of this sort cannot be accomplished satisfactorily upon an ordinary lathe. The Heiser Improved Cylinder Reboring tool manufactured by the Heiser Special Tool Co., Department A, Kingston, Mo., is well worth the investigation of our readers. The device is shown in our illustration and is exceedingly simple to operate.

It is self centering, in that it is adjusted to the unworn portion of the cylinder. It is designed to clamp upon the top of removable head cylinders or so arranged that it may be clamped upon the bottom of removable engine blocks and operated by anyone, even though they had no previous experience.

The cutting tools are easily kept in repair and are said to be self-sharpening. Though the whole machine weighs but forty-five pounds, it is very strong and



Heiser Improved Cylinder Reborer

does the work without chattering. The device does not require machine power, since it is operated entirely by hand, so that it is applicable even to the smallest garage or even the car owner may use it to advantage.

Storm Light Weight Pistons.

Because of the curtailment of production and the extreme shortage of new cars, proper shop equipment for the rebuilding of old ones is far more important than ever before. The brisk demand for shop tools, equipment, extra parts, etc., indicate that the repair men in general are alive to this situation and are grasping the opportunity for making increased profits.

It is important that the motor cylinders and pistons should be given proper attention. Leaky cylinders and heavy unbalanced pistons cause more trouble and waste more fuel than all other defects combined. It is obviously useless to repair other parts and neglect these important items. The motor cannot truthfully be said to be rebuilt unless the cylinders and pistons have been put into proper condition.

The Storm Manufacturing Company, in addition to manufacturing Cylinder Reboring Machines and other motor repair equipment, have established a most extensive piston service for the purpose of providing special light weight pistons of the highest quality for any make of motor, and furnish them in any desired oversize.

When the great number of different makes and models of pistons now in use are taken into consideration, some idea of the magnitude of this service may be had. At the present time core boxes for over 1,000 different styles and sizes are used and about an equal number of patterns, and new ones are being added as required. These are all numbered and careful record kept for immediate reference. This insures the greatest possible promptness in filling orders with the least possible chance of error or delay.

The Storm Light Weight Pistons are made of a special close-grained semi-steel metal. They are made as light as is practical, often as much as 50 per cent lighter than the original pistons furnished by the manufacturer. Yoke-shaped reinforcements are used to provide ample strength combined with lightness. This light weight is a most desirable feature, reducing vibration, stress and wear. They are finished to size with extreme accuracy, can be fitted closely and, therefore, are very durable. A motor provided with these pistons will give the longest and most economical service. They should not be classed with the ordinary oversize pistons so often made by small foundries using the original piston as a core box, making them very heavy and undesirable.

No doubt many of our readers will avail themselves of this opportunity. The manufacturer's address is Storm Manufacturing Company, Thompson, Iowa.

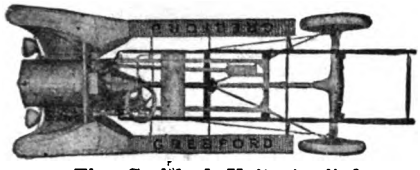
Replacement Parts.

The United Motors Service, Inc., of Detroit, Michigan, announces that they have a complete circuit of service in Delco, Klaxon, Remy electrical replacement parts throughout the country, in various cities. At these various branches one may obtain genuine parts for repairs or replacements on Delco, Klaxon and Remy electrical equipment, as well as secure expert factory trained workmen to make the necessary repairs and adjustments on any of these units.

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The Grebford Unit.

This year will see the conversion of many Ford cars into trucks and every car owner who intends to fit his Ford car with a light truck or delivery body should investigate the Grebford unit manufactured by the Greb Co., 197 State Street, Boston,



The Grebford Unit Applied

Mass. This extension will lengthen the Ford wheel base to as much as 136 inches and comes in a number of sizes.

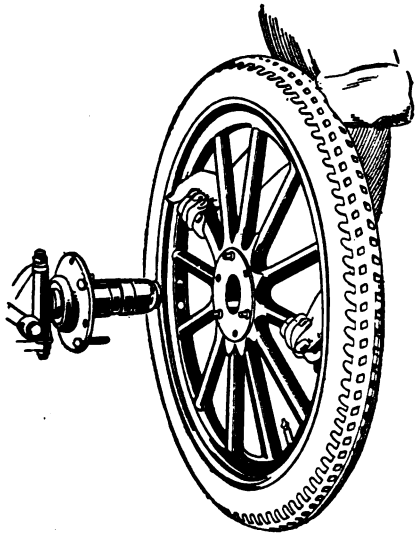
In putting the Grebford unit into place the regular Ford rear axle, together with the drive shaft, is removed and the sides of the Ford frame are drilled for bolts which fasten the extension frame into place. A special length of driving shaft, together with a universal joint and ball housing, is furnished and the regular Ford rear axle carried out to the length of the wheel base desired. For carrying the rear spring an extra heavy stayrod is used, together with spring saddle and necessary fittings. The whole extension is complete with necessary dressed rods, bolts, nuts, washers, etc., making a complete unit.

E-Z Way Demountable Wheel.

The J. P. Gorman Co., Inc., 382 Canal Street, New York, are manufacturing a product which, if used, places the Ford in the class with many high priced cars in one respect. It relieves the Ford owner of tire changes on the road.

The E-Z Way Demountable Wheels and Wheel Carrier, as the product is known, consists of a complete set of four Ford flanges and special collars, together with bolts, nuts, and other necessary fittings. The flanges are installed in place of the regular Ford wheel hubs. The regular Ford wheel hubs are discarded and the Ford wheels are fitted with the special inside flanges and outside plates. When this installation has been completed three nuts retain the wheel to the demountable hub.

In making a tire change these three nuts are removed and the wheel may be immediately slipped from its place. With the



E-Z Way Demountable Wheel

equipment is furnished a spare wheel together with a wheel carrier which may be mounted at the running board. The illustration herewith shows how the wheel is applied.

Norwesco Twelve-Twenty.

By perfecting a non-freeze solution that the motorist can test with an ordinary Battery Hydrometer, the Northwestern Chemical Co., Marietta, Ohio, feels that it has supplied a need which has been long felt by every motorist who has ever driven a car in freezing weather.

Norwesco "Twelve-Twenty" is the name of this radically different liquid. The easy-to-test feature is the "big seller" back of it, but running close second in importance is the fact that "Twelve-Twenty" requires no mixing or dissolving—it comes ready to use right out of the can.

Because it can so readily be tested, "Twelve-Twenty" does away with all guess work in connection with radiator protection, says the Norwesco Co. No longer need the motorist wonder whether his non-freeze is strong enough every time a cold snap comes. If he has followed the Norwesco suggestions to test his radiator solution at regular intervals, he knows that his radiator is absolutely safe down to twenty degrees below zero—the point at which the Norwesco solution freezes.

The solution is made with a specific gravity of 1220, hence its name. If evaporation or leakage cause changes in the solution the hydrometer discloses that fact and a weak solution may then be restored to standard strength by the addition of "Twelve-Twenty." If the test shows undue strength, dilution with water corrects the defects. Thus a motorist may test his non-freeze solution as he does his tires or his battery and the close check he can keep on the solution should go a long way toward reducing last winter's record of more than 100,000 frozen radiators.

There has been much complaint by motorists over the tendency of the commonly used anti-freezing solutions to "find" leaks. This fault is said to be totally lacking in "Twelve-Twenty." On the contrary, the tendency of "Twelve-Twenty" is to keep the cooling system fluid-tight. Its boiling point is twelve degrees higher than that of water, so it evaporates very slowly. In this way it overcomes one of the chief objections to alcohol mixtures. The claim is made also that it warms the motor more quickly than water, thus reducing the "popping" and enabling the engine to settle sooner into a smooth, easy motion.

A powerful campaign of advertising in the *Saturday Evening Post* and other publications is expected to put Norwesco "Twelve-Twenty" into the "big seller" class along with Se-ment-ol, the radiator ce-



Norwesco 12-20 Container

ment, with a million users; Shalex the radiator cleaner, and the other well-known products of the Norwesco "Chemically Correct" Line.

The Masters Gasoline Meter.

Something unique in the line of automobile accessories is being manufactured by the Irvin W. Masters, Dept. 3, Muncie, Indiana, and known as the Masters Gasoline Meter. The device is unique in that it measures the amount of gasoline going



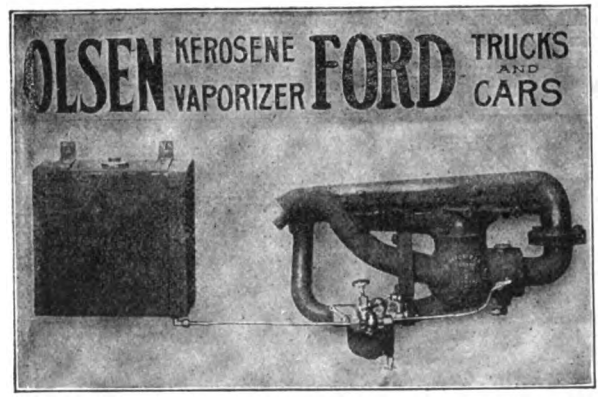
into the carburetor. It is mounted upon the dashboard or instrument board and is constantly before the driver. As it gives a record of the amount of gasoline consumed the driver can, at a glance, see just what mileage he is getting.

If the mileage is poor the driver's attention is called to it and he is, therefore, able to make the necessary adjustments to the carburetor. To a certain extent it prevents engine trouble by indicating trouble before the cause affects the engine. It is to the gasoline system what the ammeter is to the electrical system and the autoist of today realizes how indispensable the ammeter is. It necessarily follows, therefore, that a gasoline meter should be just as valuable.

Olsen Kerosene Vaporizer.

One patriotic act which every Ford car owner can do is to use kerosene in place of gasoline and so leave more of the latter fuel for use in aeroplane engines and abroad. Not only is it patriotic, but much cheaper to utilize this lower grade fuel, yet it is said that an engine may be operated just as well and even more efficiently on kerosene.

The United States Vaporizer Co., 214 State Street, Boston, Mass., market a device known as the Olsen kerosene vaporizer. It is easy to install and any car owner may fit his car for kerosene in two or three hours. The outfit consists of a special vaporizer manifold and hot-air attachment for the regular Ford carburetor. In addition to this is furnished an auxiliary gasoline tank for starting. In starting the engine a three-way cock is turned and gasoline used until the engine is thoroughly warmed. Then the cock is again



shut off, shutting off the gasoline and admitting kerosene only.

The manufacturers claim that the engine will operate just as satisfactorily on kerosene as upon gasoline, and are willing to substantiate their statement by a thirty-day guarantee. If the purchaser is not satisfied he may return the device and receive his money back within thirty days.

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The Gasograph.

If you have ever been caught ten miles from "nowhere" in your automobile with no gasoline in the tank you will appreciate the value of the product called the Gasograph, manufactured by the New Standard Adding Machine Company, 3701 Forest Park Blvd., St. Louis, Mo. This device



The Gasograph Indicator

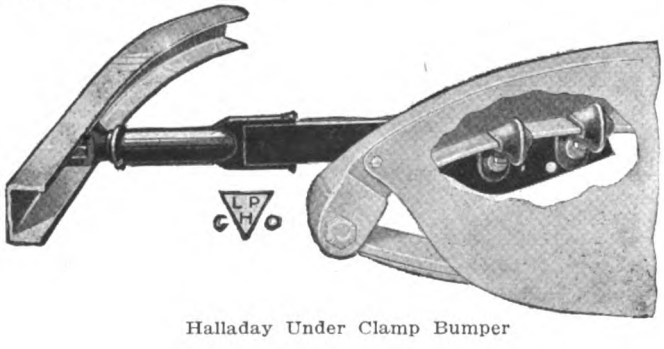
is attachable to all cars using either vacuum or gravity feed.

The indicator illustrated is attached to the instrument board and shows how much gasoline there is remaining in the tank. The tank is connected with the indicator by a length of tubing. The device operates on a very simple and scientific principle. The pressure created by the weight of the gasoline in an auxiliary cylinder at the bottom of the tank is carried through the tubing to the instrument on the dash. There are no springs, corks, floats or mechanical contrivances to get out of order and the manufacturers claim that it will operate satisfactorily at all times.

Halladay Under Clamp Bumper.

This is the latest of the Halladay Bumpers and has been designed to meet the ever growing demand for a practically universal bumper. It is secured to the underside of the frame extension by means of two clamps of such design that they instantly conform with any angle or curve of the frame. The side bars are heavy bar steel with the spring carriers of the rigid bar types or the bar clamp of the spring bar pattern securely riveted thereto.

The shape of the side arms is such that clearance is provided for frame rivets and similar parts and the bumper bar is carried in a position low enough to afford thorough protection to the car.



Halladay Under Clamp Bumper

This bumper is supplied with all the various styles and sizes of Halladay bars—all the bars of rigid type being supported by shock-absorbing springs and the spring bar supported by a rigid clamp, as shown in the illustration.

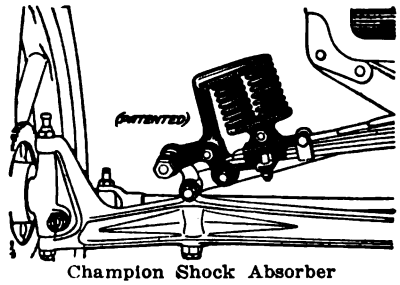
For further details write the L. P. Halladay Co., Streator, Ill.

Champion Shock Absorber.

The average motorist fails to realize the damage that is done to his car by road shocks and ordinary vibration. If he did he would be more careful of his automobile springs and if the springs did not function properly, equip the car with shock absorbers.

No matter how perfect a pair of springs may be, they do not absorb all road shocks or side sway, and so every motorist should investigate the advisability of installing a set of shock absorbers. The Champion shock absorbers are interesting because of the fact that they are designed upon the correct principle, that is to absorb by spring cushion effect rather than add to the bounce of the car. For this reason there is practically no recoil to the car springs or the car.

The shock absorbers are designed primarily for the Ford car and may be attached very easily with practically no alteration to the machine. A main casting fits in place of the regular Ford spring toggle while a smaller casting is bolted to the spring itself. Between the main and small casting are applied two large coil springs. A clever lever arrangement equalizes the shocks while the expansion of one spring in the absorber is equalized by that in the other.



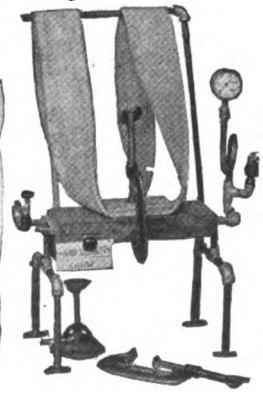
Champion Shock Absorber

For further details write the Champion Shock Absorber Sales Co., Inc., 918 North Senate Avenue, Indianapolis, Ind.

The Handy Vulcanizer.

Every garage or repair shop should be equipped to mend tires. There is probably no branch of the trade which brings in such high returns as tire repair work. The first cost of the vulcanizer is practically the only one and the repair man can spend his spare time working upon tubes and shoes.

Illustrated herewith is a vulcanizer manufactured by the Handy Vulcanizer Co., 4470 Broadway, Chicago, Ill. This vulcanizer is designed to operate upon steam heat, the pressure being generated by a gas



The Handy Vulcanizer

burner beneath the water tank. The vulcanizer shown in the cut is designed especially for repairing tubes. It is light in weight and very compact. The price is low and the equipment should be investigated by every up-to-date repair man.

The H. C. Fuel Strainer.

There is nothing that causes more annoyance than dirt or water in gasoline. Dirtless and waterless fuel will give increased mileage, more power and a smoother running engine with a minimum amount of carbon than will dirty gasoline.



The H. C. Fuel Strainer

A device which is designed to prevent both dirt and water from reaching the carburetor and so clogging up the small passages is made by the Holtzer Cabot Co., 135 Armory Street, Rocxbury, Mass. It consists of a large metal body, a cap and a fine mesh strainer through which all of the gasoline must pass. In passing through this strainer water and dirt are separated from the fuel and drops to the bottom of the strainer.

To clean it one need but open the plug at the bottom and the dirt and water drop out. The strainer is furnished complete and anyone can install it in a very short time. Suitable connections are furnished and no changes are necessary in the present automobile gasoline system. It may be used on gravity pressure or vacuum feed systems.

The Panvar Liquid.

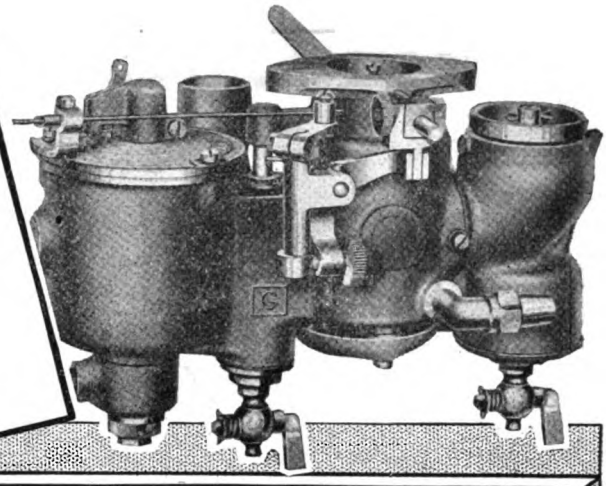
In these days when everybody wants his dollar to go farthest, the owner of an automobile is especially interested in those things which add to the life of a car or else decrease the cost of operation. One of the important items is careful preserving of the finish of a car, particularly the leather and upholstery.

If the finish and upholstery is dull and shabby, the value of the car seems to be lessened. It may be compared to a man who wears a shabby suit of clothes. He gives a bad impression. If the paint has not been chipped off, or the upholstery and leather worn too greatly, Panvar will renew the original finish. In fact, often times a finish produced with Panvar is better than the original. Panvar is not a varnish nor a polish. It is simply a renewer and resurfacer where the paint is otherwise in good condition. It may be applied with any soft white brush and dries in a few hours' time. Anyone interested in this product should get samples and further information from the Panvar Co., 603 Bulletin Bldg., Philadelphia, Pa.

New England Directory.

Every automobile dealer, garage owner or repair man who is contemplating the circulation of literature through New England should write the Sampson & Murdock Co., 246 Summer Street, Boston, Mass., for the New England Business Directory. The price is exceedingly low notwithstanding the fact that more than 300,000 names of business firms in New England are in the directory.

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A ***RAYFIELD CARBURETOR*** enables the owner to conserve from 20 to 50 per cent more gasoline than any other make. The gas you save will *drive the tanks* "over there." The money saved can be used to *buy War Savings Stamps* "over here."

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Rayfield Special for Ford Cars

Thousands of Ford owners are buying the Rayfield Carburetor because it gives them an easier starting car, greater flexibility and more fuel economy. The Ford car owner gets better all around motor performance from a Rayfield Carburetor because it is especially designed to add economical efficiency to Ford cars.

The New Rayfield Thermostat

Thousands of cars are equipped with this new device. The Thermostat insures proper temperature for best motor performance under all weather conditions. Quickly installed as a permanent part of the circulating system, it makes *any automobile* and all year 'round car. Adapted for any make of motor. Write today.

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21st and Rockwell Sts., Chicago

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Designed, Developed and Perfected for the Ford motor exclusively.

Springless, Simple, and Efficient.

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Insures a smooth running, powerful motor, maximum mileage and absolute freedom from carburetor troubles of any kind.

No change in controls or manifolds.

Easily installed by anyone.

Sold by most live dealers. If yours does not carry the D. & B., write us direct with your check for the total cost, and we will ship prepaid on receipt of order.

MANUFACTURED BY

O. C. HARRINGTON CO., 341-345 N. Crawford Ave., CHICAGO, ILL.

Mid-West Distributors: GRAY-HEATH CO., 1440 Michigan Ave., Chicago, Ill.

New England Distributors: THE POST & LESTER CO., 112 Allyn St., Hartford, Conn.

THE PRICE OF VICTORY AND THE COST OF DEFEAT

No matter what it costs in money, we shall find it cheaper to win than lose the war.

The germans are the most ruthless tax collectors on earth. They expect America to pay for the war. Their newspapers talk of an indemnity of $25,000,000,000. When they have the power the prussian autocrats have no difficulty in collecting.

Brussels, after many fines and taxes, was punished by a fine of 5,000,000 francs "on account of the attack made upon a german soldier by Ryckere, one of its police officials."

Luneville was fined 650,000 francs because of an alleged attack by some inhabitants.

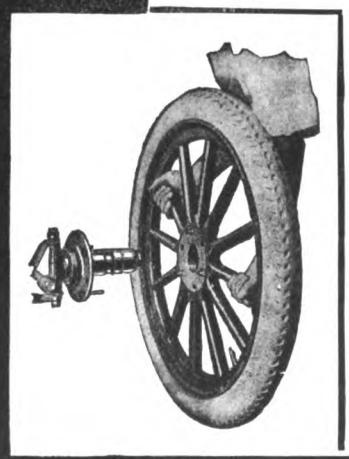
Cardinal Mercier complains that 500,000,000 francs were imposed on impoverished Belgium by December of the first year. In November, 1915, the prussians decreed that the contribution be increased to 40,000,000 francs a month from bled-white Belgium. Later it was raised to 50,000,000 francs monthly.

These instances may be increased indefinitely. At last the Belgian men were carried away into slavery. Later this was done in Poland.

It will be far cheaper to pay now than to pay when germany sets the price.

IT'S A GOOD PROPOSITION FOR ANYONE AT $12.50

Demountable Wheels and Wheel Carriers for Ford Cars



E-Z WAY Demountable Wheels are simpler, better and much cheaper than Demountable rims. Your old wheels are used and none of the Ford parts are changed. New inside flanges and collar stud bolts are simply installed. No machine work necessary.

Price, $12.50

The Outfit complete, including 4 wheel changes with inside flanges, extra spare Ford wheel, spare wheel carrier and socket wrench.

Truck-Fords, $10

To make a tire change simply remove three nuts on the wheel flange, slide off the wheel with the damaged tire, put on the spare wheel in its place and away you go in 5 minutes with E-Z Way Demountable Wheels.

MADE AND GUARANTEED BY

J. P. Gorman Co., Inc., 380-382-384 Canal Street **New York, N. Y.**

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Gaul, Derr & Shearer Co., 217 N. Broad St., Philadelphia, Pa. John V. Wilson Co., 191 Massachusetts Ave., Boston, Mass. The Efta Co., 430 Superior Ave., N W., Cleveland, Ohio. The Consumers Auto Supply Co., 1306 Wood St., Pittsburgh, Pa. Ecla Mfg. Co., 3425 So. State St., Chicago, Ill.

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CORK INSERT

For FORD cars and for BIG cars

for trucks and passenger cars

WE want to make clear the fact that Cork Insert Linings are made ***for every car that runs.***

For Ford cars there's the Cork Insert Transmission Lining. Sold in boxes containing set of three, all ready for installing.

Then there's Cork Insert Brake Lining for all the other cars, sold by the foot from the roll. Made in two thicknesses and thirteen widths.

At the left is pictured a piece of Cork Insert Transmission Lining for Fords. Below it is shown the package.

At the right is pictured a piece of Cork Insert Brake Lining used for cars other than Fords, while below is represented a roll of the lining.

Stops grab, slip, chatter, in Ford transmission

Cork Insert Transmission Lining for Fords stops the grabbing and slipping—vibration and chattering. Requires less pressure on the pedal. Makes the Ford Brake BRAKE. Saves the Ford rear end. Outwears several sets of ordinary linings.

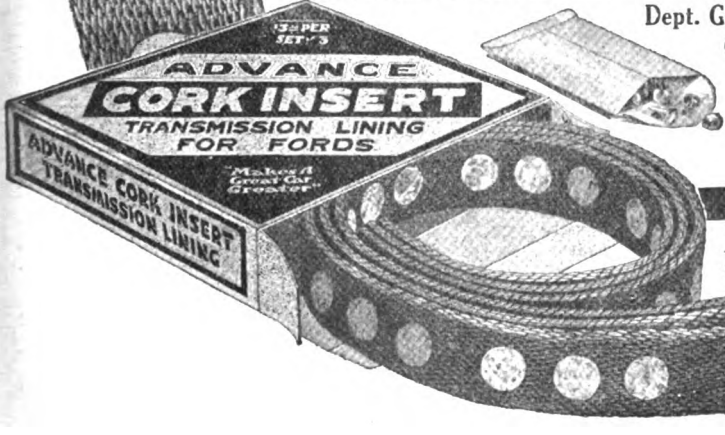
Oil, slip, grease proof—insures a safe brake

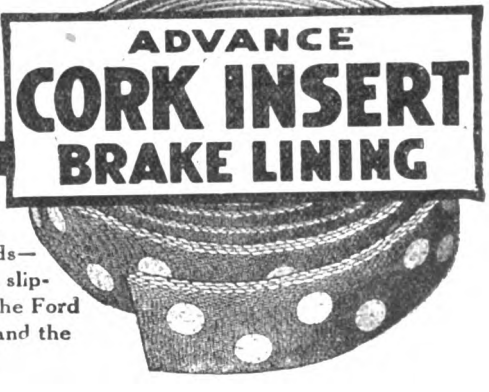
CORK INSERT BRAKE LINING has the highest co-efficient of friction obtainable in a brake lining. It produces smoother, more positive braking action. Less pressure is needed on the pedal. It is unaffected by oil or grease. No grab, slip, SQUEAK. Gives longer wear and better control of brakes.

DEALERS: The Cork Insert line is a wonderful money maker for the trade. It supplies a staple need with products that serve the user better and mean more profitable business for the dealer.

Any jobber will supply you with Cork Insert. Ask the next jobber's salesman who comes in about it.

ADVANCE AUTOMOBILE ACCESSORIES CORPORATION
Dept. G-5, 56 E. Randolph Street
Chicago, Ill.





Another big seller is Cork Insert Fan Belts for Fords—they stop all slipping—keep the Ford fan fanning and the engine cool.

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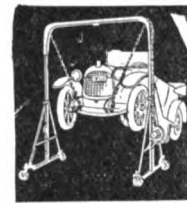
Windshields
Superior Lamp Mfg. Co. 92

Wrenches
Faw, J. H., Inc. 25
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Walden Worcester, Inc. 96

Will dissolve in the water and stop that leak in the Radiator or Water Jacket
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Ask your Dealer or write direct.
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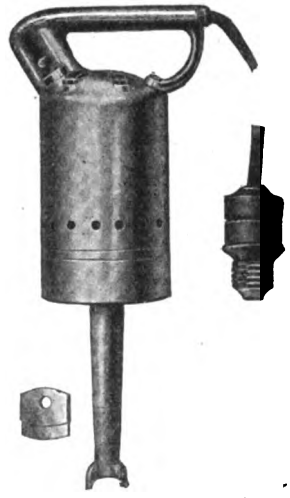
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Thousands of dealers recommend it for repairing punctures, blowouts and inner tube tears—it will fix torn-out valve stems and do other difficult jobs—without the need of heat or tools.
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Any Gear, Wheel, Pulley, Off Quick as a Wink, When You Use the "LITTLE GIANT" GEAR and WHEEL PULLER
Terrific pulling power. No "struggle"—no slipping. "Harder the pull, the tighter the grip." Sure, speedy action. Adjustable to 13 in. Tough Drop Forge Steel construction. Price $10. Big Dealer Discount. Send NOW. Money back if not satisfied.
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SAFE, SIMPLE, PORTABLE. Will handle any car, anywhere. Write for catalog of our complete line of garage equipment.
Weaver Manufacturing Co.
Springfield Illinois

B. F. S. Valve Grinder.

Every up-to-date garage man realizes that the operation of valve grinding occupies considerable time if the old hand method is used. Such work may be accomplished in one-quarter of the time or less if an e'ectric valve grinder is used. Such a machine is manufactured by the B. F. S. Manufacturing Co., 54 Hermon street, Worcester, Mass. This machine


B. F. S. Valve Grinder

may be obtained to operate upon practically any type of electric illuminating current and the results obtained by the use of this machine are considered better than those obtained by hand grinding. We would advise all of our garage readers to correspond with the manufacturers and write them for full details and prices on the B. F. S. Valve Grinder.

Crum Wiley Instant Gun Primer.

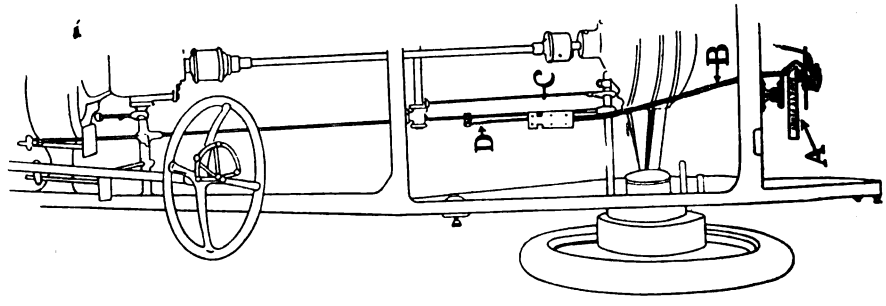
We receive requests frequently from our subscribers, asking why their gasoline engines do not start readily and we always answer by saying that it is entirely a problem of vaporization. They must furnish the engine with properly vaporized gas or it will not start.

If your engine is hard to start you should investigate the C-W Instant Gun Primer, manufactured by the Crum Wiley Mfg. Co., Peru, Indiana. This device is essentially an atomizing pump and attaches to the dashboard and takes its supply of gasoline from the regular fuel line. It is so arranged that when the pump is operated, a fully vaporized spray of gasoline is forced into the cylinders. The manufacturers claim that if the device is used an engine may be started even in the coldest weather.

Comer Auto Signal.

Have you ever gone motoring and had the feeling that you were a capable driver but that you were not sure that the trip could be accomplished without an accident because of some other driver's mistake? Often times you stop your car suddenly and the fellow in the back drives directly into you just because he does not know that you intend to stop.

The Comer Auto Signal, manufactured by the Wonder Sales Company, 616 Hippodrome Bldg., Cleveland, Ohio, is a device designed to obviate any danger of this sort. This device is operated by pressure upon the brake pedal. At the back of the car is mounted a semiphore, which under ordinary conditions is hidden behind the number plate. When the brake pedal is applied, this semiphore comes into view. The signal is positive and cannot be misunderstood because the arm is marked with the word "stop." At night this word is electric lighted. The illumination is had only when the semiphore is in the "stop" position. The driver does not have to think of the signal, for the reason that it is entirely automatic, and with this device one can be sure that his trip will not be marred by rear-end collision.



Showing how the Comer Auto-Stop Signal is attached and how it operates in connection with the brake pedal.

A—Comer Auto Stop Signal.
B—Flexible Cable.
C—Lever Attachment.
D—Wire and Clamp.

Comer Auto Signal Applied

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Classified Advertisements

Under this head will be printed advertisements of **Second Hand Cars Wanted or for Sale, Accessories of any kind Wanted or for Sale, Shops for Sale or Rent, Situations or Help Wanted, Second Hand Tools or Machines for Sale or to Exchange,** at the uniform price of **five cents a word,** including the name and address, for each insertion, payable in advance. **No advertisement will be inserted for less than 75 cents, however small.** Remittances may be made in postage stamps or in any convenient way.

Special rate of 30 cents per nonpareil line for each insertion if taken for 12 consecutive times.

Classified Advertisements

Address MOTOR VEHICLE PUBLISHING CO., 71-73 Murray Street, New York.

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Our Double Tread Tires

are saving money for our customers all over the country. They can do as much for you. Write for catalogue and price list immediately and see the offer we are making you.

M. Liben & Co.

205A W. 48th Street NEW YORK CITY

Exceptional Values IN DOUBLE CHAIN STITCHED TIRES

Size	Plain	Non-Skid	Size	Plain	Non-Skid
28x3	$4.50	$5.00	35x4	$10.00	$11.00
30x3	5.50	6.00	36x4	10.00	11.00
30x3½	6.50	7.75	34x4½	11.00	12.00
32x3½	8.00	9.00	35x4½	11.00	12.00
31x4	9.00	10.00	36x4½	11.00	12.00
32x4	9.00	10.00	37x4½	11.00	12.00
33x4	9.00	10.00	35x5	11.00	12.00
34x4	10.00	11.00	36x5	12.00	13.00
			37x5	12.00	13.00

Have your own tires Double Treaded by the same process. Our charges are only 40% off the above mentioned prices.

Send your order to our nearest office.

LEON JAFFESS, Inc.

252 West 55th Street, New York City — 6106 Euclid Avenue, Cleveland, Ohio

Double Tread Tires

Notice Our Prices Before Going Elsewhere

PRICE LIST

Size	Plain	Size	Plain
30x3	$5.00	35x4	$9.00
30x3½	5.50	36x4	9.50
32x3½	6.50	36x4½	10.00
32x4	7.00	36x5	10.00
33x4	7.50	37x4½	10.00
34x4	8.00	37x5	10.50
34x4½	8.50		

For Non-Skid, 50 cents more on all sizes.

We Carry a Full Line of New and Used Tires & Tubes

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DEALERS AND BUYERS
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INSYDE TYRES,
inner armor for automobile tires. Double mileage. Prevent punctures and blowouts. Details free. Agents wanted. Big profits.
AMERICAN ACCESSORIES CO.,
Dept. AD3, Cincinnati, Ohio

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BUY EARLY AND SAVE MONEY

Double Tread Tires and Tubes

GUARANTEED

Come to the Tire Clearing House—here are prices—clear cut and plain as daylight. We buy wholesale the best "try out" Tires—and you get the benefit—you want truthful tires, and truth is never crushed to earth if given a square deal—real truth is puncture proof—

SO ARE OUR TIRES.

Size	Plain	Non-Skid	Tubes
28x3	$4.40	$4.95	$2.00
30x3	5.50	6.05	2.00
30x3½	6.60	7.15	2.50
32x3½	7.15	7.70	2.75
34x3½	8.25	8.80	3.00
30x4	7.70	8.25	2.75
32x4	8.80	9.35	3.00
33x4	8.80	9.90	3.50
34x4	8.80	9.90	3.50
35x4	9.90	11.00	3.60

Get your order in quick for goods listed here—by all means get in touch with us for further information about our special process—it means money in your pocket. Get in right—write today—yes—today.

Look up rating in Dunn's or Bradstreet's.

Size	Plain	Non-Skid	Tubes
36x4	$9.90	$11.00	$3.60
32x4½	9.90	11.00	3.75
34x4½	11.00	12.10	4.00
35x4½	11.00	12.10	4.10
36x4½	11.00	12.10	4.25
37x4½	12.10	13.20	4.35
34x5	11.00	12.10	4.50
35x5	13.20	14.30	5.00
36x5	13.20	14.30	5.00
37x5	13.75	14.85	5.00

For (non-skid) sizes up to 32x4, 50c extra; all other sizes $1.00 extra.
For rebuilding your old tires we charge you 60% of the above prices.

B. LIBEN & COMPANY

261-A West 54th Street NEW YORK CITY 112-A East 110th Street

THE HOME OF DOUBLE TREAD TIRES

PRICE WRECKERS

Double Tread Tires with Double Lock Stitch

30x3	N. S.	$5.50	34x4½	N. S.	$8.50
30x3½	"	6.50	35x4	"	9.00
32x3½	"	7.00	36x4	"	9.50
31x4	"	7.25	36x4½	"	10.00
32x4	"	7.25	36x5	"	10.00
33x4	"	7.50	37x4½	"	10.00
34x4	"	8.00	37x5	"	10.00

We carry a full line of Firsts and Factory Blemished Tires and Tubes at moderate prices.

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Manufacturers Surplus Tire Co., 789 Seventh Avenue, New York

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STODDARD DAYTON PARTS

Pullman & Regal Parts

rear axle bevel gears and pinions

These are all new parts.

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SAVE 50% TO 75% ON PARTS—Parts for Pope-Hartford, Columbia, Reo, Buick, Overland, Chalmers, Mitchell, Thomas, Oldsmobile, Maxwell, Stoddard-Dayton, Stevens-Duryea, Corbin, Cadillac and all others. Eiseman, Splitdorf and Remy magnetos, $5.00 to $10.00. Bosch high tension magnetos, $15.00 to $25.00. Also the Mea, Connecticut National, U. & H. and K. & W. magnetos in stock. Springs, wheels, axles, etc., for all cars. Connecticut Auto Parts Co., Inc., 1070 Main St., Hartford, Conn.

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Hecht's Magneto Exchange

Dealers in Magnetos of all Makes.
Lighting Systems and Self Starters.

Expert Repairing of All Makes.

Express your Magneto, Starter and Generator to us. Same will be repaired and returned same day as received.

Distributors and Service Station for

Swiss, Heinze, National and Michigan Magnetos

— Also —

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PYRMA ALUMINUM HEEL PLATES cover or prevent unsightly holes in floor board coverings, 75 cents each. These plates and PYRMA ALUMINUM MATTING for sale by all up-to-date dealers. Metallic Automobile Matting Co., Rochester, N. Y.

FOR SALE—Baby chicks, quality, stock. Rocks 14c, Reds 15c, S. C. W. Leghorn 13c, prepaid, in lots of 50 or more. Pedigreed Airedale pups. E. R. Hummer & Co., Frenchtown, N. J.

FOR SALE OR EXCHANGE—2-ton Reo truck to sell or trade for Overland passenger cars or any other good make of equal value. Nantz Auto Co., Samson, Ala.

FOR SALE—Continental unit power plant, 6 cyl., 60 h. p., complete with carburetor, Bosch magneto and starter, very fine, $150.00. Also other motors and auto parts. Want to buy Prestolite tanks. Fifth Street Garage, Keokuk, Iowa.

FOR SALE—Semola Carbon Remover. Absolutely guaranteed. One dollar per can, postpaid. Grace Co., 3205 West Washington, Los Angeles, Calif.

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Unguaranteed

Name and Serial Numbers On

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Those Requiring the Very Best in

CYLINDER GRINDING

fitting with light grey iron pistons, leakless rings, hardened and ground pins, our work has no comparison with the ordinary, now obsolete heavy type pistons and rough boring jobs. We grind our cylinders to one-half thousandths, mirror finish. We grind our pistons on the highest grade machines to fit, two and one-half thousandths clearance. We use the McCadden leakless piston rings. Work all re-assembled ready for installation. All work positively guaranteed.

Patterns and castings in stock for every make of motor.

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PISTONS—RINGS—PINS

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CYLINDER GRINDING on automatic machinery by skilled mechanics at prices that will interest you. Gears, axles, valves and parts of all kinds made of high grade alloy steel. Send us your worn or broken parts and we will replace them. Oxy-Acetylene Welding. Cracked cylinders a specialty. Adapt Machinery Co., 1632 So. Wabash Ave., Chicago, Ill.

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WE REPAIR Lamps, Radiators, Windshields and Fenders, of every description. Largest repair plant in New York. Great accessory bargains on hand for immediate delivery.

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Largest Because Best.

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IGNITION, STARTING-LIGHTING

Genuine Parts only used in repairs.

K-W Magnetos -:- Zenth Carburetors

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NOTICE, REPAIRMEN!—If you repair Ford cars you need our line of cylinder reamers, motor stands, quick-raising jacks, portable hoists, straightening presses, speed tools and wrenches. Geneva Machine Works, Geneva, Indiana.

VULCANIZING Auto Tires is a growing business. Our plants are easy to learn to operate. Cat. is free. You save 30%. Instruction book on vulcanizing 75c. Equipment Co., 304 Eighth St., Cincinnati, Ohio.

If it's for a "Ford" car we have it.
Write for catalogue and price list.
If it's for a "Ford" car we have it.
Universal Motor Supply Co.,
White Plains, N. Y.

AUTO TOP ROOF OR SEAT COVERS, $7 and up. Parcel post prepaid. Easy to apply. Samples of cloth free. Auto Equipment Co., 310 8th St., Cincinnati, O.

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RECTIFIERS to charge from A-C circuit 1 to 8 ignition lighting or starting batteries at one time, $12.00 upward. American Battery Co., 1136 Fulton St., Chicago, Ill.

Miscellaneous

LAMP MANUFACTURERS, ATTENTION! You have the opportunity to manufacture on royalty or buy the patent of an automobile tail-lamp and rear searchlight combined that has proved its value in actual service. A. W. Morford, Fairview Cottage, Asheville. N. C.

Patent Attorneys

PATENTS SECURED—C. L. Parker, Patent attorney, McGill Building, Washington, D. C. Inventor's Handbook upon request.

PROTECTIVE PATENTS PROCURED PROMPTLY—Blue Book on Patents sent on request. Trade-Marks Registered. Robb & Robb, 288-292 Southern Building Washington, D. C.

RALPH N. FLINT, M. E.—Attorney-at-law in Patent Causes, late Assistant Examiner Internal Combustion Engine Division, U. S. Patent Office. Specialist in Internal Combustion Engine Cases. 2 Rector Street, New York, N. Y.

WANTED—AN IDEA! WHO CAN THINK of some simple thing to patent? Protect your ideas; they may bring you wealth; write for "Needed Inventions" and "How to Get Your Patent." Randolph & Co., Dept. 251, Washington, D. C.

PATENTS THAT PROTECT—Advice and books FREE. Highest references. Best results. Promptness assured. Send drawing or model for search. Watson E. Coleman, Patent Lawyer, 624 F Street, Washington, D. C.

IMPROVEMENTS WANTED—Send for free bulletins and advice. Book "Inventions—Patenting and Promoting" Free. Lancaster & Allwine, 212 Ouray Bldg., Washington, D. C.

Important New Motor Books.

Laird & Lee, Inc., Chicago, announce that they have now in press the 1918-1919 edition of "The Modern Motor Car," by Harold P. Manly. It will be issued in one compact volume of 536 pages, large 12mo, with 225 illustrations from detail drawings and photographs and a 24-page alphabetical index, durably bound in flexible keratol, with round corners and colored edges. The revisions and additions bring this standard work up to the very minute, making it a complete, practical and handy reference cyclopedia on all matters connected with the care, repair and upkeep of every type of automobile, old and new.

The same firm have also in hand for immediate publication: "The Farm Tractor —Its Care and Repair," by Wallace B. Blood. This will be uniform in style and size with "The Modern Motor Car," and at the same price, $2.00, postpaid.

Gasoline Hose Literature.

The Bureau of Standards, Department of Commerce of the United States Government, recently issued a report in which they commented upon the leaks in valve and piping used for conveying gasoline. Anyone interested in the saving of gasoline, the prevention of leaks or the reduction of fire hazard should write for the illustrated literature just issued by the Metal Hose and Tubing Co., Raymond & Tillary Streets, Brooklyn, New York. This literature will be sent free of charge to anyone sending their name and address.

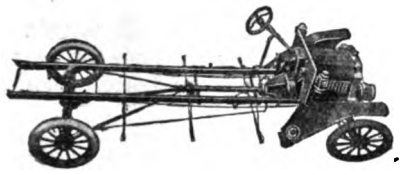
Detroit Weatherproof Top.

The Sharrer Patent Top Co., 239 West 56th Street, New York, N. Y., are offering an interesting proposition in the shape of an all-around detachable top for a number of well-known automobiles. These tops are made of the best materials in a strong and workmanlike manner and are carefully designed with flexible doors and windows which slide into the roof when not in use. Our readers who are interested in obtaining a stylish top for their car should write the manufacturers, telling them the make of their passenger car.

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AUTOMOBILE ACCESSORIES AND GARAGE TOOLS



P. B. B. ASSEMBLY FOR FORDS

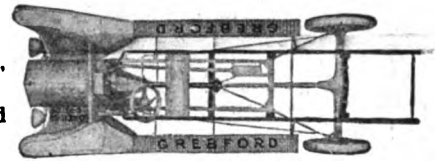
Extends any Ford Chassis to 124, 130 or 136 inch wheel base, thus making a 1500 lb. to 2000 lb. delivery truck that will stand up to the wear and tear of every-day usage in a masterly manner.

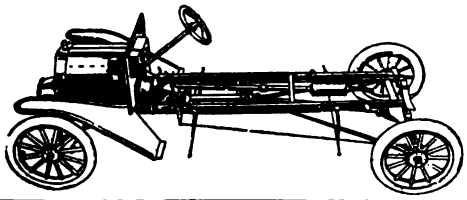
Shaft is totally enclosed. The equipment is complete down to the last screw and washer, and accompanied by explicit instructions.

GREBFORD EXTENSION FOR FORDS

The Grebford *Unit* will lengthen Ford cars in an hour's time. Wheel bases 112, 115, 118, 124, 130 and 136 inches. Capacity 1,000 to 1,800 lbs.

It is not necessary to even cut or disturb the Ford frame. Shipped all assembled and ready to be instantly installed. Write us today for full particulars.





GREB EXTENSION FOR FORDS

Old Ford cars, as well as new, can be quickly converted into first class, efficient, durable, 1000 lb. delivery trucks. Will lengthen to 115 or 130 inch wheel base. Extensions are of riveted channel iron. We furnish with the equipment all bolts, cap screws, lock washers, rivets, nuts, etc., together with full instructions.



BEACH AUTOMATIC GRIP PULLER

Quick, Strong, Durable, Efficient and Simple. Can be locked in any desired position. Positive grip, cannot unhook, and adjusts to work instantly. Three long arms are also furnished, (12 in. from bell crank to hook which open to 18 in.) Flat end screw. Gilt edge guarantee of highest possible quality and insures extreme satisfaction to the users.

GRIP PULLER JUNIOR SIZE

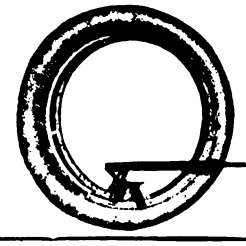
Designed for all types of motors. Will remove timing, magneto and pump shaft gears and couplings. An efficient tool for all small work. Furnished complete with two sets of arms.

The unfailing popular approval of these Grip Pullers is because their gallantry of conduct in action is sure.



BEACH UNIVERSAL RIM TOOL

It opens the rim ¼ inch. It raises one end two inches and carries it over and by the other four inches, thereby contracting the rim. It swings by center and the spring of the rim holds and locks it in the contracted position, so that the tire may be removed. After the tire has been repaired and replaced simply reverse the operation and the rim is forced back to its correct position. It actually contracts and holds the rim, then expands and locks it in its true position in one operation without removing or changing the position of the clamps. About thirty seconds are required to attach and all the hard work is avoided. Proves its value the first time used.





GREBLOX

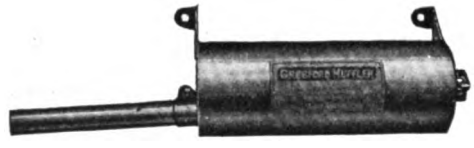
A Good Solder Cement

Mends radiator and pipe leaks, seals cracks and mends spark plugs, mends tears in upholstery and tops, stops short circuits in starting and lighting systems, restricts head-light glare and windshield rattles, secures loosening nuts and screws.

It holds forever metals, minerals, glass, cloth, wood, paper, etc.

A TOOL BOX NECESSITY. Write for full particulars about all our products.

GREBFORD MUFFLER



This muffler is self adjusting without loss of power at all speeds of the motor. The "just as good" kind have taken a back seat—Grebford Muffler has won all along the line. Be SURE—Look for our Trade Mark. Write for details.

THE GREB COMPANY, 197 State Street, **Boston, Mass.**

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SAVES 30 to 50% GASOLINE ON ALL MOTORS

SUNDERMAN
Vacuum Carburetor

GIVES GREAT INCREASE IN POWER AND FLEXIBILITY

Every Mail Brings an Unsolicited Testimonial from User or Dealer

BELOW we print a few testimonials, selected at random from letters that have come to us within the last few weeks. As is true of all commendatory letters we have printed in these pages, these enthusiastic comments have come entirely unsolicited. They speak for themselves better than ordinary advertising copy—so judge for yourself.

Increases Mileage 121 Per Cent

Jan. 15, 1918.

Sunderman Corporation: Was getting about 12 miles on a gallon of gas and my Ford car would balk on hills. Installed one of your carburetors and the results were wonderful. I can make most any hill on high, made forty miles on a gallon and a half of gas. It has paid for itself several times its cost. If I couldn't get another I would consider it priceless.—William J. Buehler, Scarsdale, N. Y.

"They Are Wonders"

May 23, 1918.

Sunderman Corporation: Carburetors sent by Parcel Post received. They are wonders. Kindly rush four more Parcel Post, C. O. D., Ford size.—R. W. Lynn, New Enterprise, Pa.

Makes Good in Gruelling Test

May 18, 1918.

Sunderman Corporation: I have put your carburetor to some very severe tests; want to tell you that I am more than pleased with it. I just returned from a trip in the northern part of the State, and there is plenty of sand there, enough to try any make of machine, but with your carburetor the little Ford acted as though it enjoyed that kind of travel, and had plenty of kick all the time.—W. H. Fisher, 1940 Frances Ave., Grand Rapids, Mich.

Repeat Order the Best Testimonial

May 20, 1918.

Sunderman Corporation: On Jan. 28th I bought a Sunderman carburetor. We like it so well I want you to send me two by express for a Ford car, check enclosed.—J. C. Powell, Fort Meade Cycle Shop, Fort Meade, Florida.

Approval From an Expert

June 1, 1918.

Sunderman Corporation: A customer of ours, Mr. Bauer, placed his order for one of the Model "BB" Carburetors, which order is enclosed. He has been using a Model "F" Sunderman Carburetor on his Ford car for over two years, and is much pleased with it. Mr. Bauer states he has received as high service as thirty miles per gal. on his Ford with a Sunderman, and averages at all times 27 miles. He is chief chemist of the largest independent starch factory in the world, and made the test when the gasoline was cool in the tank of his car, thereby not taking advantage of expansion. He recently made a run from Chicago to Cedar Rapids, a distance of approximately 260 miles, and he states that the carburetor performed very nicely during the whole run. We are merely making this report as we assume you are pleased to receive this information.—Newell Construction & Mchy. Co., Cedar Rapids, Iowa.

Makes Good in Shifting Sand

March 7, 1918.

Sunderman Corporation: I gave the Sunderman carburetor a more severe test than you ever thought of. A few miles out from Live Oak is a nine-mile stretch of sand road (by sand I mean loose dry sand), that auto drivers avoid by driving about five miles around. After the carburetor was adjusted I took my car over that road. I went in at one end in high gear and came out at the other end without changing gears, and without a miss in the engine, and that is what I call "going some." With the old carburetor the car would not perform stunts of that kind. The drivers I have spoken to about it say it sounds "fishy," as they claim it is impossible to drive that road in high. The carburetor is absolutely O. K., and if anyone from this section of the country makes inquiries refer them to me, and I will demonstrate to them what it will do.—A. E. Wrigglesworth, Live Oak, Fla.

Stops Spark Plug Fouling

May 23, 1918.

Sunderman Corporation: Please ship me by special delivery parcel post another Ford Sunderman carburetor. You might like to know what I did with the carburetor I received from you last Tuesday. It was put to a 1916 Ford, which would not run six miles without cleaning one and two spark plugs. I have run this car now about a hundred and fifty miles and have not had a skip from the motor. It really seems unbelievable, and before I announce my find to the trade would like to try a carburetor on a 1915.—Arthur L. Ryan, G. M. C. Trucks, Webster, Mass.

Over 61 Per Cent Increased Mileage

March 6, 1918.

Sunderman Corporation: Send me by express at once C. O. D. one more of your Sunderman Carburetors for Overland car No. 75. 1916. I put the Sunderman Carburetor on my Ford car you sent me on ten days' trial, and I am getting 29 miles on one gallon of gas on the state roads where I was only getting 16 to 18 miles on the other carburetor. I am well pleased.—Fred W. Ward, Wellsville, N. Y.

"Surpasses All Expectations"

April 25, 1918.

Sunderman Corporation: Words are beyond me to express my thanks and appreciation of the Sunderman Carburetor. I must say it surpasses all expectations, and when I first saw it I could hardly believe such a small instrument could run my Stoddard-Dayton, but she certainly moves and keeps on moving with a saving of gasoline.—R. A. Watson, 420 E. 153d St., Bronx, N. Y.

34 Miles on One Gallon

May 29, 1918.

Sunderman Corporation: Will you please quote me best prices on your Ford Manifold? I am using one of your carburetors and will say I have tried several makes and yours has given me the best satisfaction. I drove to Gladbrook and back last Sunday on one gallon of gas, a distance of 34 miles.—R. H. Cheney, Grundy Center, Iowa.

Ran 35,000 Miles Without Trouble

June 14, 1918.

Sunderman Corporation: Send me a carburetor for my Ford car. I have sold my car and the fellow who bought it would not let me take it off. I used the one you put on my car last year and ran it 35,000 miles and never had any trouble at all.—Frank R. Witman, Albany, N. Y.

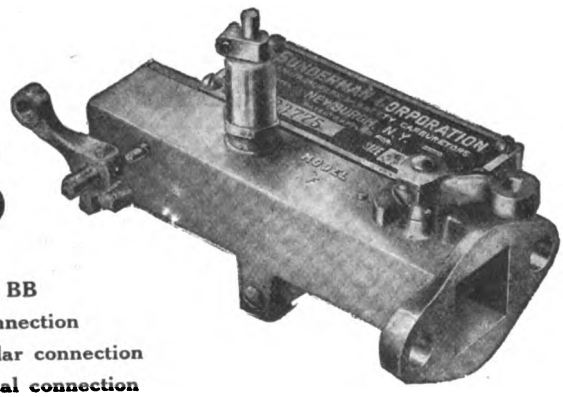
A Dominie Gives Testimony

June 10, 1918.

Sunderman Corporation: The Sunderman Carburetor which I installed on my Maxwell Model '14 last year has given more than mere satisfaction. It is a marvel of economy, and has practically cut our gas bill down to one-half. We have averaged 30 miles per gallon on Standard Oil Co. gasoline, using exactly 10 gals. on a 300 mile trip.—Rev. G. Mack, Ashton, Ill.

Model F
Special for
FORD, METZ
and
SAXON FOUR

$6



MODEL BB
$8 without connection
$10 with regular connection
$12 with special connection

Order NOW!

If you are a car owner, you want the Sunderman Carburetor now—the bigger part of your season's driving is just ahead of you, and it is the part of good business sense and economy to let this matchless instrument begin to make good for you at once.

If you are a dealer or operate a garage or a service station, you can make a great deal more money this season by selling and installing this great carburetor. The price brings ready sales, it carries substantial profit for you, and the Sunderman Carburetor positively makes and holds good customers for you.

Sunderman Corporation, 13 Chambers St., Newburgh, N. Y.

PACIFIC COAST BRANCH: 593 MARKET ST., SAN FRANCISCO, CAL.

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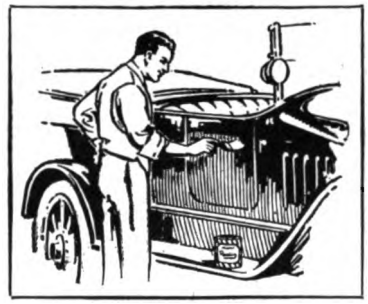


The Quick and Economical Way to Restore the Finish on Dull-Looking Cars

WHEN a car becomes dull because the original varnish has lost its lustre, a coat of **PANVAR** will make it bright and the finish as lasting as the day it left the factory. Because your car has a dull, shop-worn look it does not follow that it needs an expensive repainting job. If the paint is good, all it needs is a final coat of **PANVAR.**

PANVAR has qualities not found in varnishes. **PANVAR** is as thin as water so anybody can "Flow it on" from a wide brush. Being "self-levelling" it will not show streaks or brush marks. It is transparent so it can be used over any color.

PANVAR, when applied to the plated parts, adds to their life and preserves the shine. On the leather seats, and imitation leather, too, it is fine. It makes leather last longer and does not stiffen it, nor will your clothes stick to the seats on hot days. It helps the tops also—they become more water-proof after **PANVAR** has been applied. **PANVAR** will not crack, peel or craze, show flaky or turn white.



PANVAR

Dries Over Night

One quart will do an average car. Price at all live dealers is $1.50 a quart, 4 quarts for $5.00.

THE GREAT FEATURE WE CLAIM FOR PANVAR IS that with **PANVAR** you can refinish your car yourself and know it will be a good job—it's amazingly easy to apply. The finish lasts as long as it would with a costly varnishing job.

THINK OF IT—APPLY TONIGHT AND RIDE AS USUAL TOMORROW—but in a nice, bright, new-looking car.

Should your car need repainting, insist on a coat of **PANVAR** being first applied as **PANVAR IS ELASTIC** and paints are not—so a coat of **PANVAR FIRST,** as an undercoat, will help hold the paint together. **PANVAR IS EQUALLY AS GREAT AS A PRIMER OR FINISH.**

SEND $1.50 FOR A QUART OR $5 FOR 4 QUARTS

(Delivery charges paid to all U. S. points) or send 10 cents for a sample if you wish to try PANVAR before ordering.
(It is guaranteed to do what is claimed for it)

TRY YOUR DEALER FIRST—IF HE DOES NOT HAVE IT ORDER DIRECT

The Panvar Company, H. A. MEYERCORD, Manager Sales **608 Bulletin Bldg., Philadelphia, Pa.**

Pacific Coast Offices: Charlton B. Perkins Co, Managers, 528 Monadnock Bldg., San Francisco, Cal.

DEALERS
Time Saving Coupon

Rush by express, all charges paid, one dozen quarts PANVAR including twelve samples and advertising matter for which I enclose money order for $12.00.

The Panvar Co., 608 Bulletin Bldg., Phila., Pa.

Firm Name.....

Address.....

By.....

Those ordering from points over 2,000 miles from Philadelphia send $1.00 additional.

MOTORISTS
Order Direct Coupon

Please send by express or parcel post paid.....quarts

.....sample.

The Panvar Co., 608 Bulletin Bldg., Phila., Pa.

Name.....

Address.....

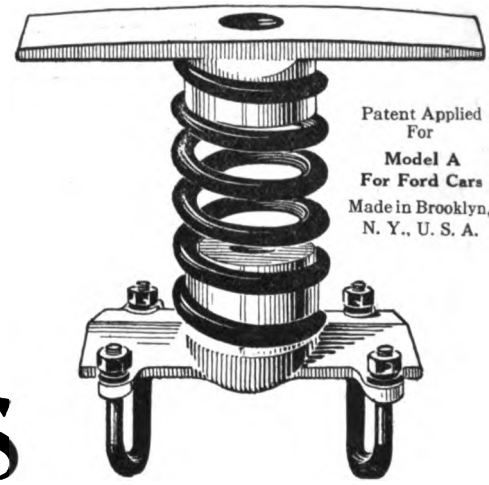
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Send check or money order unless known to us.

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Mr. Ford-owner! Attention!

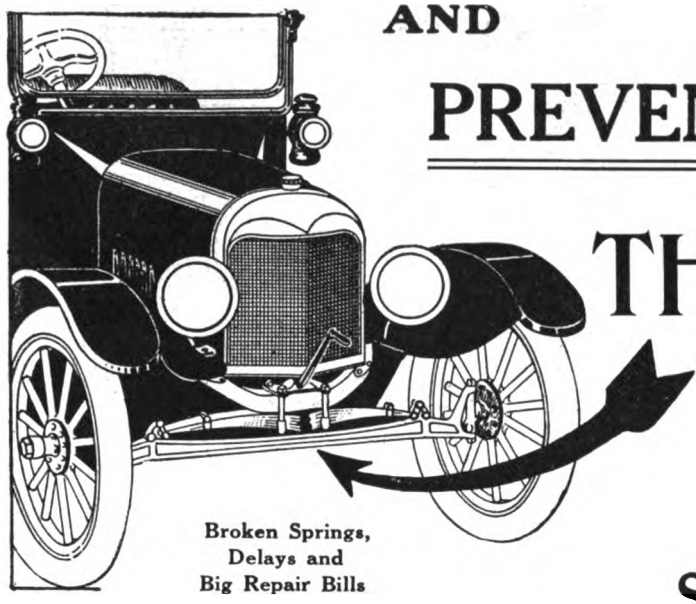
USE THIS →



Patent Applied For
Model A
For Ford Cars
Made in Brooklyn, N. Y., U. S. A.

AND

PREVENT



Broken Springs, Delays and Big Repair Bills

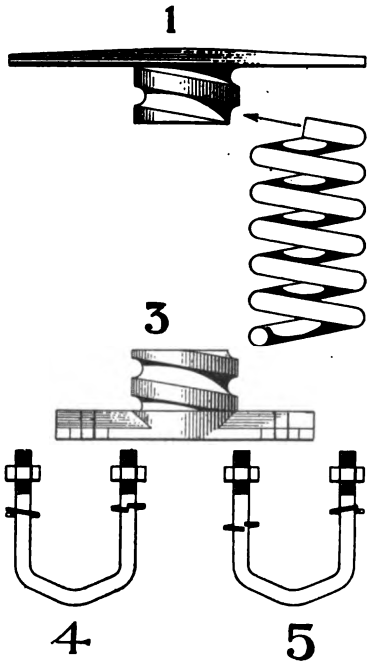
THIS

FOR - - - $6.50

Can Be Installed in Less Than 20 Minutes by the Average Layman.

PLUNKETT SHOCK ABSORBERS

"A Shock Absorber and Rebound Snubber in One"



No. 1. Fastens under front spring as shown in illustration below.

No. 2. Screws snugly into grooves or threads on Nos. 1 and 3 the same as you would screw a nut on a bolt.

No. 3. Is fastened on to axle with U bolts (Nos. 4 and 5) as shown in illustration below.

NOTE. The principle of the Plunkett Shock Absorber is that it is placed into position on the car without any tension or strain being on the shock absorber spring.

In other words—when the car is standing still, the shock absorber is in a normal position; therefore, when the car starts it takes the slightest action or greatest concussion. On the rebound motion of the car, as soon as shock absorber spring reaches its normal position, it starts to stretch or pull, thereby positively eliminating the extensive rebound which is so common on Ford cars.

The Plunkett Shock Absorber can be installed without changing or altering any of the Ford parts or taking away any of the natural action of the Ford spring as intended by the Ford Motor Car Co.

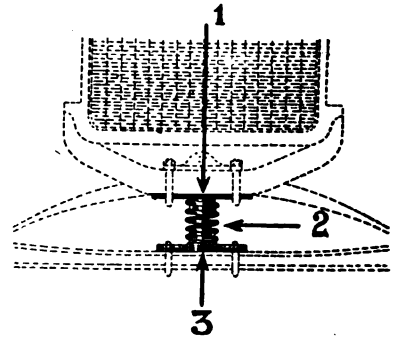
Price, $6.50 each complete

On receipt of check or money order, will ship prepaid to any part of the United States.

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Agency Open—Send for Dealer's Proposition



PLUNKETT SHOCK ABSORBER CO., Inc.

323-5-7 WASHINGTON STREET : BROOKLYN, N. Y.

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HUDSON

Crank Case Repair Arm

PRICE F. O. B. PHILADELPHIA, $1.50



A Wrench and 15 Minutes Does the Work

Hudson Has Done His Bit

1,000,000 Fords.
2,000,000 Broken Crank Case Arms.
2 10-hr. days to tear down engine and weld.
Time:—40,000,000 working hours.
Money spent:—At 90c per hour, $36,000,000.
Repair with the H. C. C. R. A. in 15 minutes.
Applying 2,000,000 H. C. C. R. A. at four an hour, 500,000 hours.
Time saved; —39,500,000 hours.
Money saved; $33,000,000.



In Stock with Jobbers in United States and Canada

If your jobber's name is not here, tell us. We will wake him up—or try to

ARKANSAS—Little Rock
Arkansas Auto Appliance Co.
CAL.—Los Angeles
E. A. Featherstone
San Francisco
W. E. & W. H. Jackson
McCoy Motor Supply Co.
CONN.—Bridgeport
Excelsior Auto & Supply Co.
American Hardware Store
Hartford
Post & Lester Company
New Haven
C. S. Mersick
Henry Horton
Hessell Hoppen Co.
Sam Schwarz
Todd Rubber Co.
DELAWARE
Wilmington
Automobile Supply Co.
Delaware Hardware Co
Wilson Hardware Co.
ILLINOIS—Chicago
Hudford Co. of Chicago, Inc.
Erwin Greer Auto Co.
Automobile Supply Co.
Electric Appliance Co.
Gray Heath Co.
Beckley Ralston Co.
United States Rubber Co.
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Universal Accessories Co.
H. T. Hearsey Co.
The Gibson Co.
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IOWA—Council Bluffs
Rothert Motor & Supply Co.
Des Moines
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KENTUCKY—Louisville
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Andrew Cowan & Co.
Belknap Hdwe. & Mfg. Co.
Harbison & Gathright
MASS.—Boston
Chandler & Barber Co.
Brophy, Barrabee Co.
George R. Bascom
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Linscott Supply Co.
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Motor Car Equipment Co.
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Springfield
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Worcester
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MAINE—Portland
James Baily Co
L. W. Cleveland Co.
MICHIGAN—Detroit
Automobile Equipment Co.
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Grand Rapids
Michigan Tire & Access. Co.
Tisch Auto Supply Co.
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Minneapolis
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Johnstown
Swank Hardware Co.
Lancaster
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Miller & Ecret Company
Roberts Electric Supply Co.
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Pittsburgh
Auto Accessories Co.
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Joseph Woodwell Co.
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Lyle Brothers
Jackson Motor Supply Co.
United States Rubber Co.
J & M Auto Supply Co.
Reading
Bright and Company
E. S. Youse Co.
Scranton
Chas. B. Scott Co.
Lansing Hardware Co.
Williamsport
Williamsport Saddlery Co.
York
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RHODE ISLAND
Providence
Apco Shop
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Congdon & Carpenter
Goodby-Rankin Co.
Post & Lester Company
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Cameron & Barkley Co.
Florence
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Fort Worth
Texas Auto Supply Co.
WASHINGTON—Seattle
Washington Auto Supply
W. VIRGINIA—Wheeling
Earle Rogers Co.
WISCONSIN Madison
L. T. Schoelkopf
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HUDSON MOTOR SPECIALTIES CO., 1932 Arch St., PHILADELPHIA, PA.

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The perfect piston ring that makes the motor sing



Worn out, inefficient piston rings leak and waste as high as 25% gasoline—1 drop in 4.

Hi-Comp Piston Rings deliver every atom of power from every drop of gasoline. Its design is logically right and it is mechanically perfect.

HI-COMP PISTON RING
THE RING THAT MAKES THE MOTOR SING

Made from two perfectly balanced eccentric rings into one perfect concentric ring, from secret process grey iron. Each ring ground and polished under oil—not buffeted—to preserve the right temper and insure perfect fit. Each of the two rings subjected to minutest micrometer tests. Every complete Hi-Comp ring is critically examined by experts.

It will pay you to install Hi-Comps. They satisfy. They overcome usual troubles due to carbon—wearing down of cylinder walls, pistons and piston rings; faulty ignition, skipping, knocking; pitting of valves and valve seats; smoky exhausts. Made by an old established piston ring company. GUARANTEED to give MORE POWER on less gasoline and oil.

Write for interesting booklet, specification chart and details of 90 day guarantee.

Continental Piston Ring Co.
Memphis, Tenn.

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We are teaching thousands the right way to make Automobile Repairs

From FRANK BLUM, Ohio.

"Your paper is better on operating and repairing a car than all the other papers combined that I am taking. Your 'Trouble Department' alone is worth more than the subscription price."

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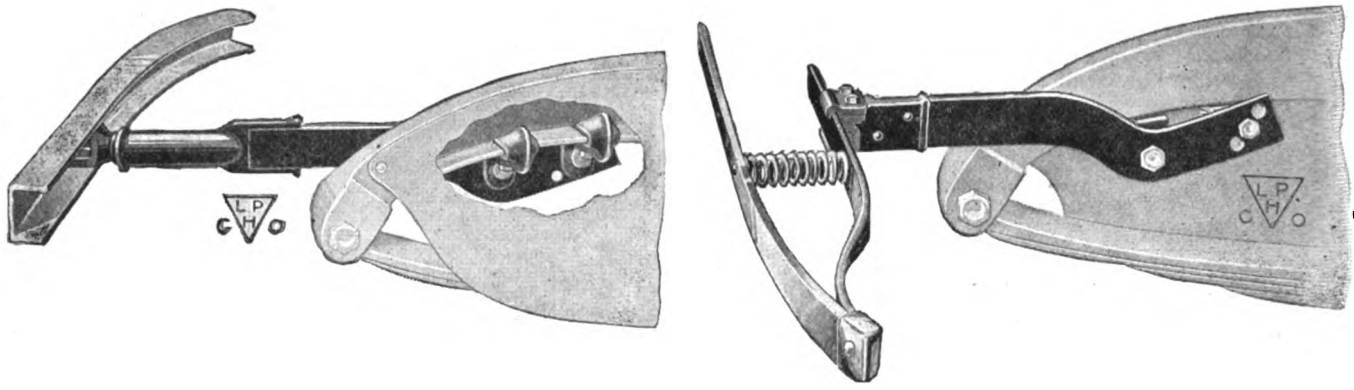
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When it is So Easy and So Inexpensive to have it looking neat and new?

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Frank Miller's Mohair Top Dressing

and its appearance will surprise and delight you.

Not a bright, shiny gloss, but a soft, silky black lustre,—the quiet, rich finish so much desired for cars of the better class.

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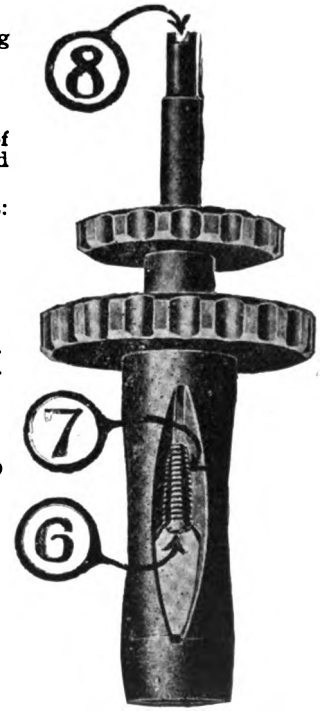
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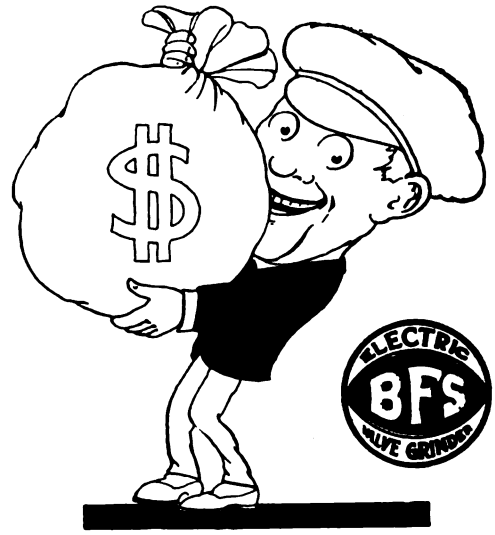
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We don't know of any better book than this on the market. It is bound in flexible cloth, and comprises road maps of the following states:

All of the New England States	Pennsylvania	Virginia	
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These states are largely patronized in the Summer by tourists from all over the country, who like to visit the Catskills, the Adirondacks, and the White Mountains. The "RED ROAD BOOK" also gives maps of that portion of Canada reached by routes from Northern New York, Northern New England and Northern Maine.

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The aim in the production of this work is simplicity. Too many automobile route publications attempt so much, that in their efforts to be "complete" they become "confusing." The publishers of this work say that many years of motor travel and the observations of others lead them to the opinion that once out of the confusion of a city's streets, on the broad highway, the need is less for the detailed, must-be-closely followed printed words, comments and instructions of the path itself, but rather the need is for the accurate knowledge that the road to town A and thence to town B is of "automobile goodness," and that it proceeds via this and that village, this or that side of a lake or a mountain, with crossing railroads, or paralleling trolley lines, as a check on location.

Thus is one free to carry out his original purpose; namely, to see the country, with this instruction book.

If with such maps as are shown in this road book, one sees that they are to pass within a few miles of a well-known and picturesque lake, or historic hamlet, or perhaps desire to go "across country," a good road map is the best aid for this freelance mode of travel.

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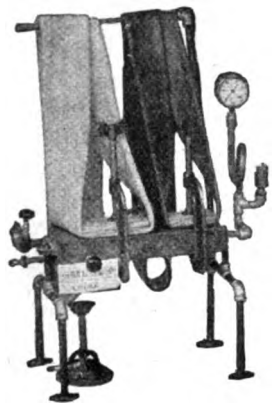
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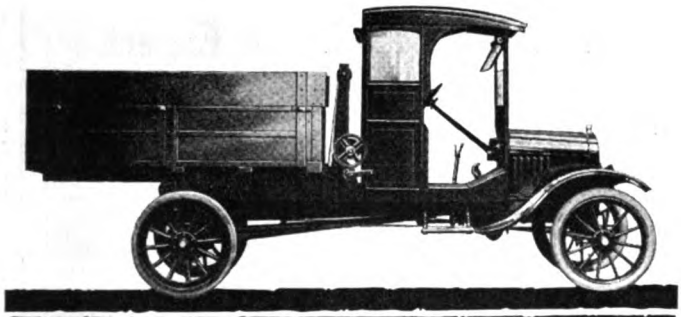
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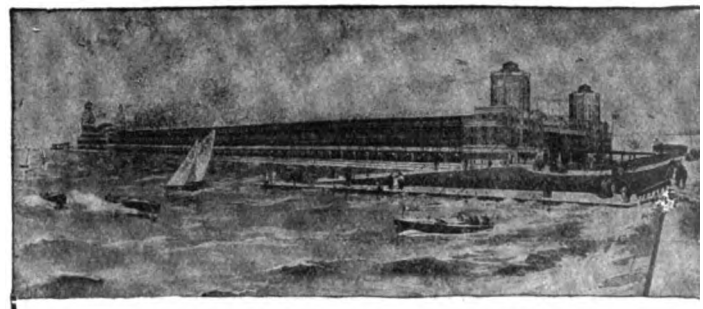
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TRACTOR AND ACCESSORIES
EXPOSITION

September 14th to 21st, 1918

TRUCKS—

This will be America's most representative war-time truck show—embracing the giants of transcontinental fame and the little local delivery hustlers. Trucks are in the lime-light because of their great service at the front and at home—and all the best trucks will be shown at the Municipal Pier from September 14 to 21.

TRACTORS—

Greatest ally of the Allies—all the giants of the farm and battlefield on display. Small tractors, large tractors—America's representative tractor manufacturers will participate in this great exposition—Municipal Pier, Chicago, September 14 to 21, 1918—a stimulant to the broader agriculture necessary to meet war-time needs.

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A big part in war-time conservation is being played by automobile accessories which increase efficiency—mileage and service—and decrease cost of upkeep and operation. The accessories shown at The Pier, September 14 to 21, will bring home to everyone the tremendous strides which American manufacturers have made toward helping to win the war.

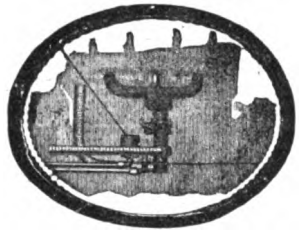
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Use Kerosene



DRIVE YOUR CAR TWICE AS FAR AND BUY YOUR FUEL FOR LESS THAN HALF.

OFFICIAL TEST
DETROIT AUTOMOBILE CLUB
June 4, 1918

UNDER instruction of Mr. W. S. Gilbreath, manager of the Club, I acted as observer of a test run made with your Kerosene Equipment on June 3rd.

The equipment in question was attached to a 1914 Model T Ford, which was not in the best mechanical condition at the time.

One and one-fourth gallons of Kerosene were consumed in the test, a distance of 37 7-10 miles being traversed, much of this on ordinary country roads. About eighteen miles of the trip was through fairly heavy traffic. A speed of 22 miles per hour was maintained.

Performance of the car was equal to, if not better than could have been done on other types of fuel.

DETROIT AUTOMOBILE CLUB,
E. W. SULLIVAN, Observer

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Order direct from this advertisement. Enclose purchase price, $25 for complete Equipment on 30 days trial.

If you find it doesn't do all that you expect—if you think it isn't an *immense money saver*—return it within a month from date shipped, and get your money back. No risk. Send order today on

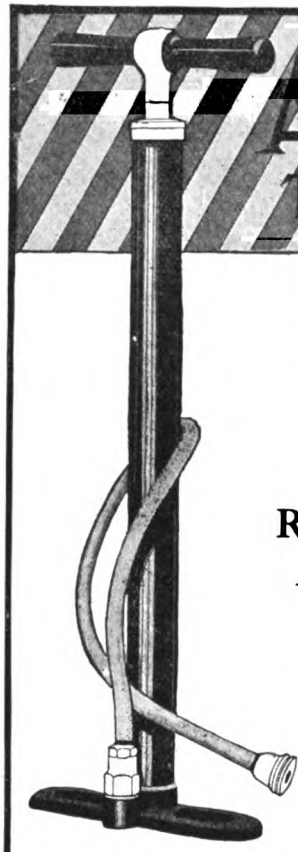
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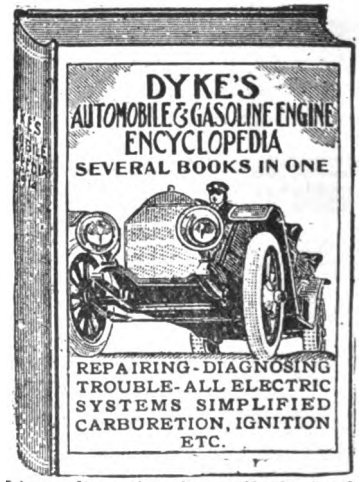
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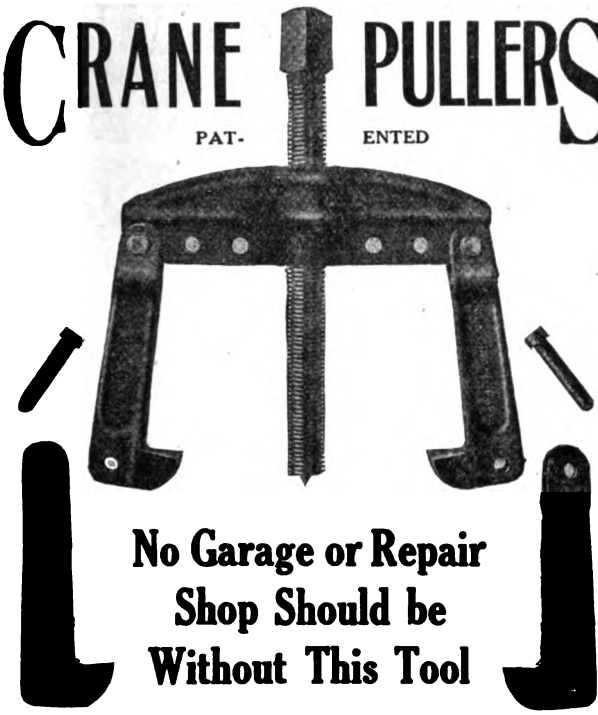
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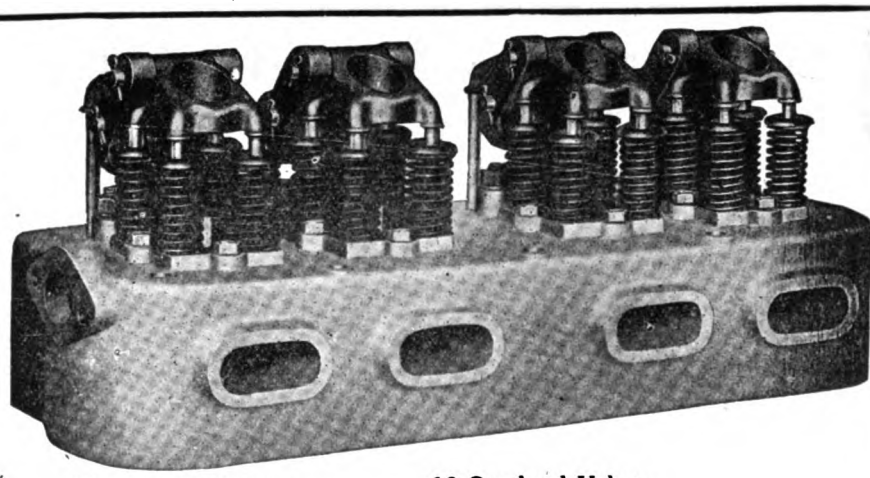
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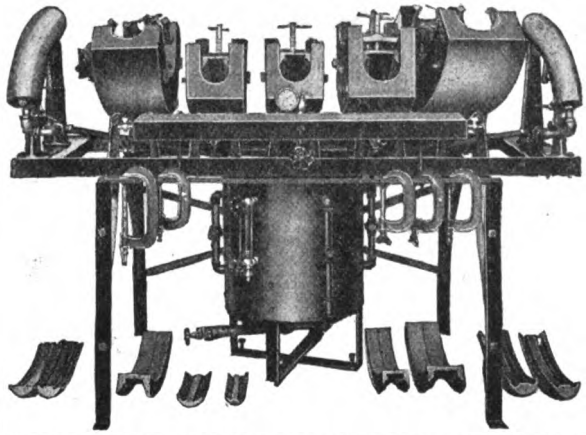


Illustration shows Vanderpool 5 cavity model that does every kind of repairing—($100.00 worth a day). Also made in 2 and 3 cavity (smaller) sizes.

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Only vulcanizer recommended by leading Tire factories because the only one that repairs tires EXACTLY AS THEY WERE MADE. The VANDERPOOL is the vulcanizer now bought by VETERAN Tire Repairers after trying other makes and DISCARDING them. Cheapest of all to operate. Write for Free Book of instructions. Tells everything. Testimonials from Vanderpool users now making big money. Get into business for yourself. Be independent!

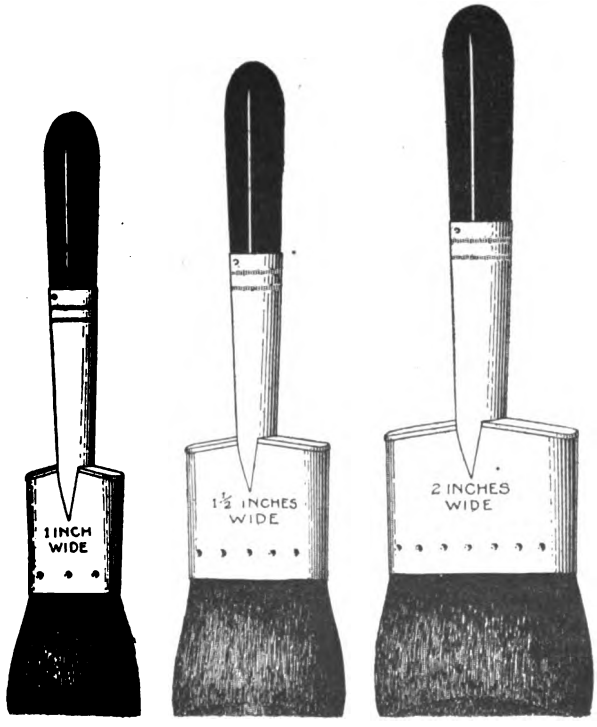
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IMPORTANT POINTS ABOUT PAINT AND VARNISH BRUSHES

A Set of Three Brushes and the Automobile Dealer and Repairer for One Year for $2.00



Brushes Needed in Repainting and Varnishing an Automobile.

Did it ever occur to you that there was much difference between a good paint or varnish brush and a poor one? Probably not. To most people a brush is just a brush. Yet an analysis shows that there is an almost measureless difference between a good brush and poor one.

For instance, a properly made Flowing Fitch brush is hermetically sealed, so as to keep the paint, or whatever may be used, from getting into the brush at the top and loosening the hairs. All such properly made brushes are solidly set in glue cement inside a leak-proof ferrule, and a whole row of neatly clinched nails are driven in at the end of the ferrule to give added security, and a guarantee that the hairs will not pull out.

A Fitch brush is *smooth*, *soft*, and *flowing*, and does not "mush" up or get flabby like a cheap brush, but holds its springiness. The trouble with cheap brushes is that the ferrule is nothing more than a single band of tin, open at the top, with a couple of nails jabbed through. When you use such a brush the cheap hair will pull out and scatter all over your work, because it is not held in securely enough to stand the drag of the brush in painting or varnishing.

A brush may be washed with gasoline or kerosene oil, but to clean it thoroughly turpentine should be used. No brush used for painting should be used for varnishing.

We have recently made arrangements with one of the best manufacturers of these properly made brushes in New York to offer a set of Three in connection with a subscription to the AUTOMOBILE DEALER AND REPAIRER for a year for an even $2.00. These brushes sell at retail for $1.40. It will be seen, therefore, that there is a substantial advantage in sending to us for the AUTOMOBILE DEALER AND REPAIRER for a year, and for a set of these brushes.

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Remit by check or money-order, and your name will be entered as a subscriber to the AUTOMOBILE DEALER AND REPAIRER for a year, and a set of these brushes, which are just the right size and shape (see illustration, which is exactly one-half the actual size of the brushes,) will be sent to you, postage prepaid.

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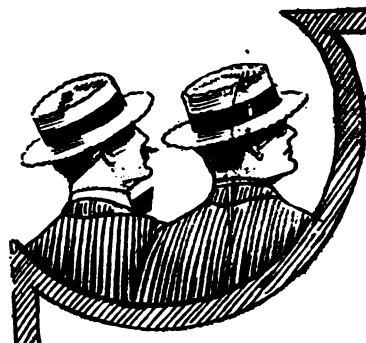
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53-55 West 66th Street New York

(Representatives wanted)



"Did you ever hear of the men 'who sat on their packs', Al?"

"They were soldiers lost in the desert, half dead and starved—found sittin' on their packs, that were full of food! Here you're wailin' about no Fords, merchants waitin' for trucks and you 'sit on your pack', watchin' joy ridin' Fords go by the hundreds."

"What good'll they do me, Jim?"

"Get out and get 'em. Put a Hay-Dee Extension on the chassis an' you'll get 115 to 130 inch wheel base; you'll have a truck that has 8 to 9 feet of loadin' space; that'll haul from 500 to 2000 lbs.; you'll give the merchant a dandy truck, with a body complete at less than $800; you'll get a four-time profit on the whole deal; you'll make friends and new business every day—say, what more d'y' want?"

"Hully gee, Al, where did you get that stuff?"

"You write Hayes & Diefenderfer. They'll show you something that'll open your eyes. You'll get a pep and punch in your sales! That's what you need. Go to it and don't wait. Write 'em today!"

HAY-DEE EXTENSIONS for FORD cars

$55 *A Business Builder for Live Dealers* **$60**

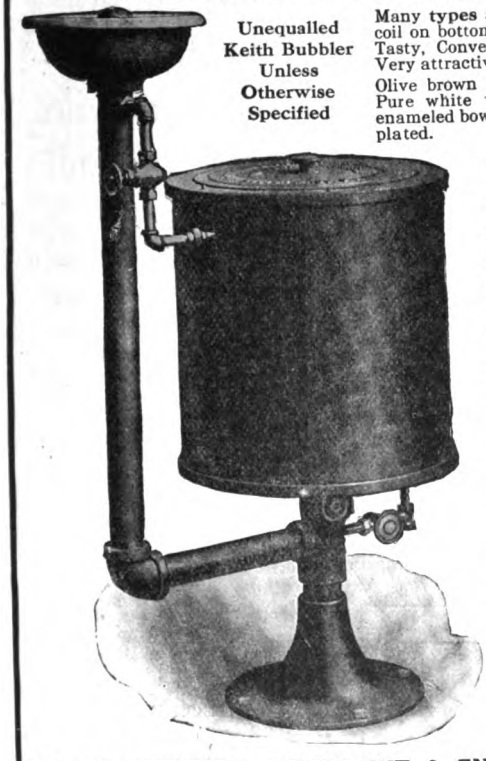
The only attachment for a Ford making a Truck and re-convertible to a pleasure car at any time. Not a cut or hole to make. Anyone can put it on with a wrench.

HAYES & DIEFENDERFER

1872 Broadway NEW YORK

BUBBLING FOUNTAINS

For Attachment to Municipal Supply



Unequalled Keith Bubbler Unless Otherwise Specified

Many types and sizes—May have coil on bottom as well as on sides. Tasty, Convenient and Efficient. Very attractive appearance.

Olive brown baked enamel finish. Pure white vitreous cast iron enameled bowl. Fittings nickel-plated.

Wastes above or below the floor.

Our Lines Include:

Sanitary Wash Bowls (in Batteries), Bubbling Fountains (Plain and Ice Cooled), Metal Lockers, Metal Stock and Pattern Storage Racks, Metal Shelving, Metal Cabinets, Vault Fixtures, Soda Kettles (40 and 60 Gallons), Metal Stools and Chairs, Water Mixers, Work Benches, Bench Legs, Full Line of Plumbing Fixtures, Etc.

THE BEST IS THE CHEAPEST

Send for list of users. Many Thousand in use.

This cut shows our No. 604—75 lbs. of ice—cork insulation—15½ coils of ½" brass tubing No. 22 gage. Thorough workmanship—selected materials—tested and adopted by those whose judgment is unquestioned.

SEND FOR CATALOGUE

MANUFACTURING EQUIPMENT & ENGINEERING CO.

Shop and Factory Metal Equipment Outfitters

136 Federal Street, - - - Boston, Mass.

WORKS AND MAIL ADDRESS: Framingham, Mass.

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WITH THE ARRIVAL OF

Superford HONEYCOMB RADIATORS



For Ford Pleasure and Commercial Cars

The FORD OWNER is now assured of a HIGH-CLASS RADIATOR, carefully constructed, that will render service efficiently and greatly improve the operation of the motor.

These Radiators Are Built with:

The Same THOROUGHNESS
The Same THOUGHT
The Same CARE
The Same MATERIAL
The Same SKILLED ARTISANS

That Have Made the Name "SUPERFORD" Synonymous with Quality and Dependability in Motor Cooling. Radiator Units Are Made of Brass.

MODEL No. 16-F
For 1909 to 1916 Ford Cars
Made like the 1918 in two units, with black detachable casing.
Price Each, $28.00

"SUPERIOR" AUTOMOBILE PRODUCTS

MODEL No. 18-F
For 1917-1918 Ford Cars
Made in two units, with black detachable casing. . . . . .
Price Each, $30.00

Catalog No. 6 Now Ready—Write for Trade Proposition!

SUPERIOR LAMP MFG. CO., 136 W. 52nd St., NEW YORK, U. S. A.



IF you've got a good thing—back it up with good advertising copy in the Automobile Dealer and Repairer—don't let your product die of dry rot.

In our "put it over" department we create advertising ideas, draw pictures, border designs and lay-outs which attract the reader's attention—holding, at the same time, the proper commercial value.

We write advertising that will boost your product—bring it from obscurity and, through our medium, put it into the markets of the world.

WRITE OR WIRE
Motor Vehicle Publishing Co.
71-73 Murray Street
New York City

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VULCANIZERS Complete Cure—One Heat **MILLER TIRES** Extra Ply—5,000 Miles

NEW 1918 MODEL "4 CAVITY" EN BLOC

Insulated Air-Cooled Flanges Prevent Marking Tires

Complete---Gas Burner

$165.00



One of the 60 Kinds in Style

From 90c up

We teach Tire Repairing FREE OF CHARGE at factory or by mail.

Extra Ply Tires

Give More Miles at Less Cost

"C O G" & "Wrapped" Treads contain 25% more Fabric and Rubber than Standard.

More Fabric Means Less Blowouts—More Miles

New 80-Page Catalog on Request

Exclusive Tire Distributors are Repeating Sales

For Price-Lists—Repeat Sales System

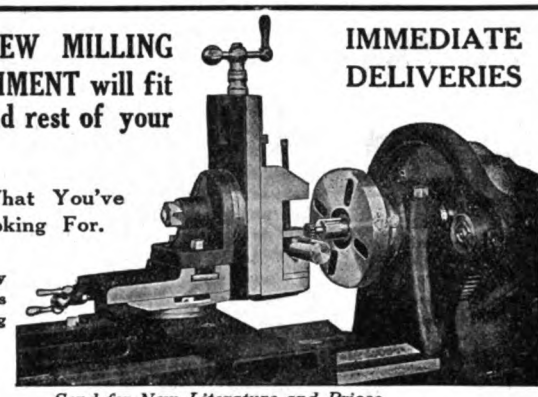
WRITE DEPT. "H" CHAS. E. MILLER ANDERSON, IND., U. S. A.

THIS NEW MILLING ATTACHMENT will fit compound rest of your lathe.

Just What You've Been Looking For.

Very Handy for All Sorts of Milling Jobs.

IMMEDIATE DELIVERIES



Send for New Literature and Prices.

Barnes Drill Co., Inc. 1907 818 Chestnut St., Rockford, Ill., U. S. A.

Builders of the All-Geared Drill and Gap Lathes.



SCAIFE COPPER-BRAZED AIR TANKS

are positively guaranteed to hold air indefinitely without loss of pressure.

CAUTION

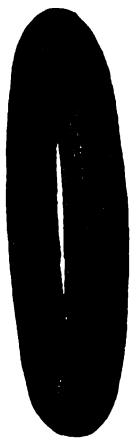
Do not confuse Scaife Copper-Brazed Tanks with the cheap Welded or Soft-Soldered Tanks made by others.

We Also Manufacture

SCAIFE GASOLINE STORAGE OUTFITS

Send for Catalogues.

WM. B. SCAIFE & SONS CO., First National Bank Bldg. PITTSBURGH, PA.



KIMBALL TIRES

Are Doubling Profits for Some Dealers

Write for Our Interesting Offer

Write and ask us how we do it. They are positively not seconds, but first-class fresh casings. The following are dealers' prices:

	Non-Skid	Tubes		Non-Skid	Tubes
30x3	$ 8.75	$1.90	32x4	$16.45	$3.05
30x3½	10.95	2.15	33x4	17.55	3.10
32x3½	12.45	2.25	34x4	18.25	3.20

Prices on Other Sizes in Proportion

Send us your order today, accompanied by cashier's draft on Chicago or New York, or money order. Large and small orders given immediate attention. These tires are sold without a guarantee. Write today for territory. Prices will be advanced shortly. Place your order now.

The Kimball TIRE & RUBBER CO. Incorporated

This "Straight Side" Type is Made Also Clincher Type

1469 Michigan Av. CHICAGO



MELLIN'S

ADJUSTABLE GEAR SHIFT EXTENSION LEVERS

Will Fit All Cars

(PATENTED)

Over 20,000 in Use



DODGE, OVERLAND "75" and "90," and NASH - - List, $1.25

BUICK, REO, OAKLAND, and all cars having a removable ball on the top of shift lever - - - - - - - - List, $1.50

HUDSON SUPER SIX, OVERLAND "85" and all cars having a solid lever, where the ball is not removable and the extension must be clamped on - - - - - - - - List, $2.00

ALL GOODS SHIPPED PREPAID

WHEN ORDERING GIVE NAME AND MODEL OF YOUR CAR

AT YOUR **Jobber's** *OR WRITE*

M. & H. NOVELTY CO., 857 E. 24th St., Los Angeles, Cal.

AUTO MAILING LISTS

44,756	Auto Dealers, U. S.	$75 00 or	$2.50 per M.
8,104	Ford Dealers, U. S.	18 50 or	3.00 per M.
6,519	Truck Dealers, U. S.	12 00 or	3.00 per M.
	(Showing make of truck handled)		
150,000	Truck Owners		7.00 per M.
5,400	Truck Owners in Chicago	15.00 or	3.50 per M.
4,943	Garages, U. S.	75.00 or	2.50 per M.
55,967	Auto Supplies, Retail, U. S.	90.00 or	2.50 per M.
45,054	Repair Shops	75.00 or	2.50 per M.
404	Auto Manufacturers		3.00
73,674	Auto Dealers, Garages, Supplies and Repairs in one list, no duplicates	$125.00 or	2.50 per M.
1,505	Auto Supply Jobbers		5.00

(All lists typewritten and show financial ratings, and are 1918.)

COMPLETE LIST AUTO OWNERS AND FORD OWNERS, $2.50 PER M.

FURTHER PARTICULARS

TRADE CIRCULAR ADDRESSING CO.

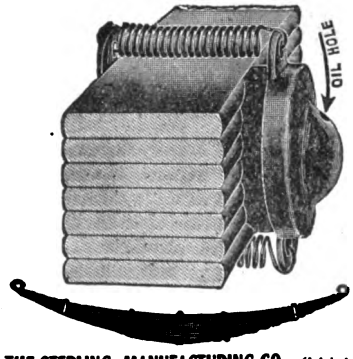
166 West Adams Street, Franklin 1182, CHICAGO

STERLING SPRING LUBRICATORS

Inconspicuous Easily Attached

No Tools Required

AUTO SPRINGS NEED OIL



Oil pads and cases firmly held by strong coil springs and *they won't slip or fall off.* Easily and conveniently re-oiled without removing. Sterling Oilers insure perfect *automatic* lubrication.

PRICE 25c EACH

Ford Set $1.00

One size fits all makes of cars.

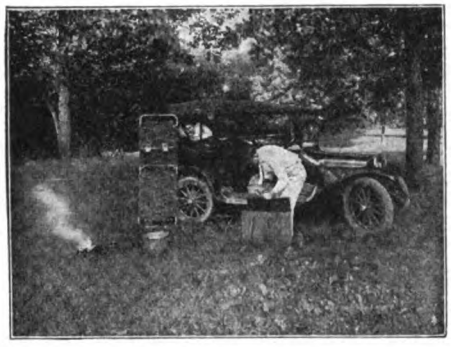
TAKE NO SUBSTITUTE.

If you cannot obtain them from your source of supply, write us.

THE STERLING MANUFACTURING CO., (Lubricator Dept.) 307 Frankfort Avenue, Cleveland, Ohio

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A KOT THAT FITS ANY AUTOMOBILE



The Any-Kar Auto Kot is the simplest, most inexpensive, and comfortable sleeping bed, that rests over the tops of the rear and front seats. One or two of these kots will fit into any five or seven passenger car. Special size for Fords. The kot is furnished with a heavy ducking and folds to a small package and can be carried while touring the same as a grip.

Price $12.00, f. o. b. Peoria

Manufactured by the

PEORIA AUTO KOT COMPANY,

PEORIA, ILL.

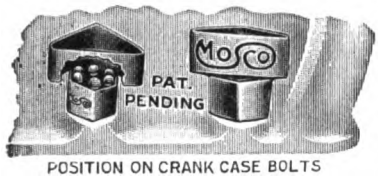


MOSCO SPECIALTIES

Mosco Socket Nut and Bolt Holder for Ford Car

A REAL TIME SAVING DEVICE. Takes the place of that other man whose help is usually required for this operation.

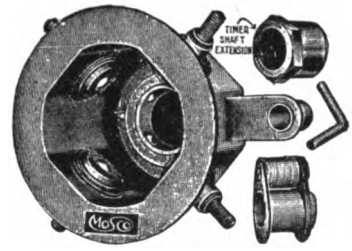
Simply slip MOSCO Nut and Bolt Holder over the top of each engine or Transmission nut or bolt head, the wings protruding above the hex socket engage wall of crank or transmission case and prevent nut or bolt head from turning while the man underneath the car unscrews the bolts. When replacing put head of bolt on top, slip on the MOSCO socket and proceed as in taking out. Made of heavy pressed steel, with reinforced wings welded to body of socket. All case hardened and finished bright.



POSITION ON CRANK CASE BOLTS

Price 15c Each.

Improved Bemus Ball Contact Timer for Ford Car



Cheapest in the long run.

All wearing parts renewed at cost of 27c.

Easier Starting.

Grease Cannot Prevent Contact.

Unbreakable Heavy Steel Shell.

Smoother Running.

Contact is Positive.

Longer Life.

No Fibre Ring to Wear Humpy.

Price $2.25.

YOUR JOBBER HAS THEM IN STOCK

MOTOR SPECIALTIES COMPANY, - - - WALTHAM, MASS.

MR. AUTO ACCESSORY MANUFACTURER
WHY NOT
Carry Your Advertising Into A New Field



Write to us today for full particulars about this new field.

M. T. Richardson Company

71-73 Murray Street, New York City

FRANKLIN MYERS

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NO NEED TO KEEP A STOCK OF HEADLIGHT GLASSES

This circular glass-cutter cuts perfect Headlights 2 to 20 inches in diameter. Cuts plain and plate glass, any thickness. In demand by autoists. Earn liberal profits.

"RED DEVIL" TOOL CATALOG FREE

SMITH & HEMENWAY COMPANY, Inc.
83 Coit Street
IRVINGTON, N. J.

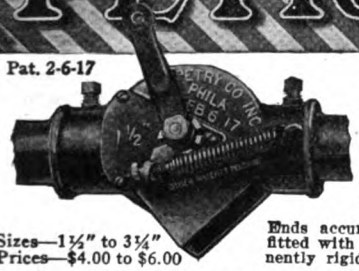


Style No. 033, sample 50 cents

Discount to Dealers

PETRY CUT OUT

Pat. 2-6-17



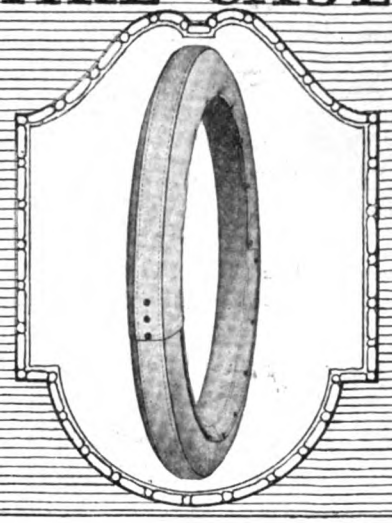
Gases expelled to the rear through patented flared opening, prevents all back pressure. Lever has seven adjustments, which make easy installation. Spring is away from the body of Cut-out, does not absorb heat, has a simple tension adjustment and easy action, no strain on the exhaust pipe.

Ends accurately machined for pipe size and fitted with set screw, which insures a permanently rigid installation.

Sizes—1½" to 3¼"
Prices—$4.00 to $6.00

N. A. PETRY COMPANY, Inc.
1313 Race Street Philadelphia

The ALLEN TIRE CASE

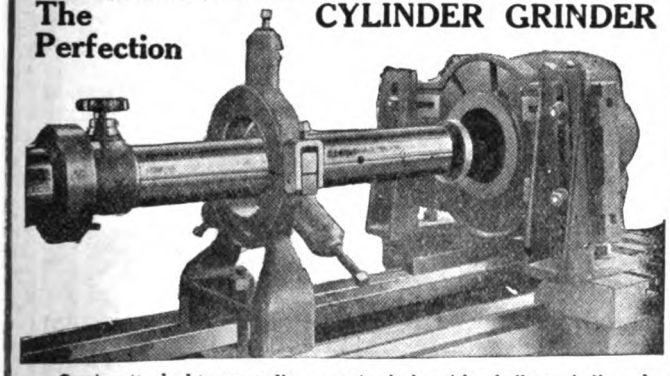


Tire Protection

means increased mileage, but real protection depends upon *quality*. The Allen Tire Case is invariably acknowledged as superior both in design and material. Three styles, various colors and color combinations.

THE ALLEN AUTO SPECIALTY CO.
16 West 61st St., New York 2007 Michigan Ave., Chicago

The Perfection CYLINDER GRINDER



Can be attached to any ordinary engine lathe with a hollow spindle and a swing of fourteen inches or over. Descriptive literature on request.

WOOD & SAFFORD MACHINE WORKS, GREAT FALLS, MONTANA

AN OPERATING TESTIMONIAL

A reliable piece of machinery is always made of reliable parts. That's why this Mine Rescue Truck, in life and death service, depends for sure ignition on



REFLEX SPARK PLUGS





REFLEX equipped White Mine Rescue Truck, an operating testimonial.

For your customers, Reflex Plugs will duplicate the performance of Reflex Plugs in thousands of White Trucks at the war fronts and in commercial use, everywhere.

You can sell a Reflex for every requirement—and make a good profit on every type. We authorize you to sell them on a money-back guarantee. Write us today regarding the agency for Reflex Plugs and its advantages to you.

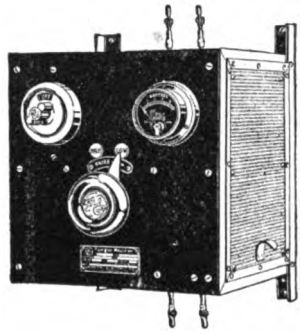
THE REFLEX IGNITION COMPANY
1711 Payne Ave., Cleveland, U. S. A.

Special Request

¶ IN writing to advertisers for circulars or information, you are earnestly requested to mention in each case that the advertisement was seen in the "Automobile Dealer and Repairer." By so doing you will confer a favor on both publisher and advertiser

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FOR BATTERY CHARGING



Tungar RECTIFIER

The 6 amp. 75 volt Tungar Rectifier is a practical device demonstrated by actual service. It equips your garage for efficient battery charging at a much lower cost than any other reliable device of similar capacity.

Ask for Folder 63951

GENERAL ELECTRIC COMPANY

General Office: SCHENECTADY, N. Y. 35 A-3

INSURANCE AGAINST TROUBLE



MOTOR **SASCO** STRAINER



KEEPS DIRT AND WATER OUT OF THE CARBURETOR

This means a steadier running MOTOR and the elimination of many mysterious stops while on the road.

MOTORISTS have learned that a perfect strainer is an absolute necessity, and so thousands are sold every day.

HOW MANY ARE YOU SELLING?

Attractive dealers' proposition. Write for full details.

MANUFACTURED BY

SAGE BROS, Inc., 780 Union St., Brooklyn, N. Y.

GOOD TIRES AT CUT RATE PRICES



High grade, firsts—not seconds, not blemished or rejected tires, but good tires; tires that will bring every user back for more. Sold without guarantee.

RIBBED TIRES

At these prices are the biggest bargains you ever purchased in your life—Think of it!

PRICES TO DEALERS:

	Non-Skid	Tubes		Non-Skid	Tubes
30x3	$ 8.00	$1.90	32x4	$16.10	$3.05
30x3½	10.25	2.15	33x4	16.80	3.10
32x3½	12.00	2.25	34x4	17.25	3.20

Write now for dealers' proposition, or better yet, rush in a trial order with Chicago or New York draft, express or P. O. money order. If you prefer, send 20% of amount with your order and we'll ship goods C. O. D. subject to examination. Investigate this now. Let us tell you how we can do it.

BUDRICK RUBBER CO.

Dept. B, 36 S. State St., Chicago

IF YOU WANT THE DEPENDABLE KIND OF DIFFERENTIAL AND TRANSMISSION GEARS AND SPROCKETS



That can be relied upon to be accurately machined, and of the highest grade material, to fit all makes cars,

Write for prices and terms to

William Ganschow Co.

Morgan and Washington Blvd.

CHICAGO, ILLINOIS

GET INTO THE Tire Repair Business



Tire Repairing is the most profitable branch of the rubber business, and it requires but a very small capital. There are over seven million tires in use at the present time, and all of them must be repaired. Get into the business and get your share, but start right. Equip your shop with O'Neil Vulcanizers, the vulcanizers that have stood the test for over ten years and are used and recommended by tire manufacturers and the majority of tire repair concerns. Send for our catalogue.

THE O'NEIL TIRE & RUBBER COMPANY

AKRON, OHIO

WALDEN WORCESTER WRENCHES

SPECIALISTS IN MOTOR CAR WRENCHES

GUARANTEED SERVICE TOOLS

JOBBERS—DEALERS EVERYWHERE, ASK THEM

SEND FOR CATALOG No. 100.

WALDEN-WORCESTER, INC., WORCESTER, MASS.

Made from Oil-Tempered Spring Steel Wire



They Remove Carbon Where Others Will Not

PATENTED MARCH 28, 1916



Cut out experimenting—get down to business. Why not own a set of FLEXIBLE CARBON SCRAPERS? They are the only scraper on the market that will do a satisfactory job without taking the motor to pieces. Compounds are dangerous. All good mechanics advise scraping carbon. Over 100,000 sets now in use by Auto Mechanics.

Price Per set, $1.50. Ask Your Dealer or Write

Flexible Carbon Scraper Co. 1421 W. Washington St. Los Angeles, California

THE

ARMSTRONG MFG. CO.

BRIDGEPORT, CONN., U. S. A.

New York Office 248 CANAL ST.

like their products, need no introduction to the experienced steam or gas fitter.

To others, our Catalogue No. 14 will show why we are so popular.



"Makers of Genuine ARMSTRONG Stocks and Dies."

Send for free sample of The Automobile Dealer and Repairer.

MOTOR VEHICLE PUBLISHING CO.

71-73 Murray Street, New York

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POWER

FROM PISTON RINGS

Good oil engineers have found that 80% of the excess oil and unburned gases pass around and behind reciprocating piston rings. The result is lost power and excessive carbon.

PRESSURE PROOF PISTON RINGS

cannot reciprocate. The spring expander automatically takes up any excess in the ring groove. All possibility of either oil or gases passing between the cylinder walls and the piston is overcome. This is why Pressure Proof Piston Rings permanently eliminate carbon and restore maximum power.

Write for "New Facts About Piston Rings" and special dealer proposition

PRESSURE PROOF PISTON RING CO.
169 MASSACHUSETTS AVE. :-: BOSTON, MASS.

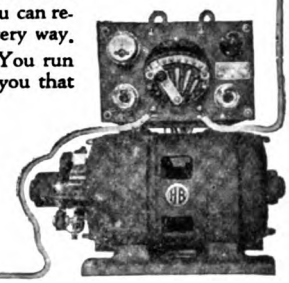
Big Profits in HB Battery Charging

The demand for recharging auto storage batteries is growing larger every day. The curtailment in automobile manufacture means more last year's cars in use, more batteries to be recharged, and *bigger business* and *bigger profits* for the up-to-the-minute garage.

This HB 500 watt battery charger will recharge any make or size battery, handling 1 to 7 batteries at a time. Operated from city current or engine, without any electrical or mechanical experience. Current costs only 12c to 15c per battery. Autoists pay 75c to $1.50. You make 60c to $1.35 on every battery you charge. Hundreds of HB owners are clearing $40 to $60 extra profit every month. So can you.

$15 Starts You in This Money-Making Business

Cash payment of $15 puts charger in your garage. Balance in 9 monthly payments of $20 each, which earnings should easily more than pay. Tear out this ad and send it with your name for full particulars or send first payment of $15 with trial order. Under *absolute money-back guarantee* you can return machine if it is not satisfactory in every way. Don't wait. Send trial order at once. You run *no risk* and machine itself will convince you that it can easily make *big profits for you*. Write or wire today.



HOBART BROS. COMPANY
Box D7, TROY, OHIO

TITAN
STORAGE BATTERIES and TITAN PARTS

Fulfill every need of the Repairman. They represent the highest skill in the Art of Battery Making.

Batteries for Every Car. Parts for all Batteries of Every Make. Prompt Shipments from Stock.

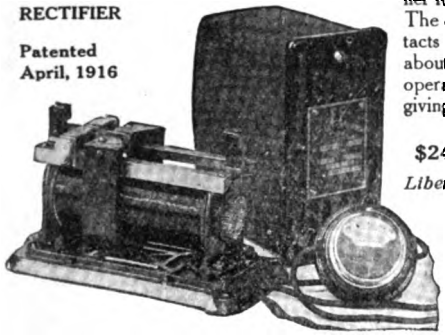
Write for Bulletin.

GENERAL LEAD BATTERIES COMPANY
CHAPEL STREET AND LISTER AVENUE
NEWARK, N.J.

F-F BATTERY BOOSTER

MAGNETIC RECTIFIER

Patented April, 1916



A full wave magnetic rectifier for public or private use. The copper and carbon contacts cannot stick. Costs about ½ cent per hour to operate. Thousands in use giving satisfactory service.

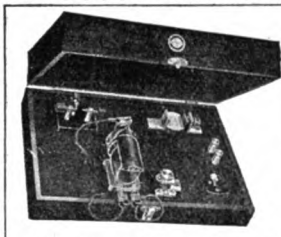
Sells at
$24 and up, complete

Liberal Discount to Dealers

Also F. F. Charging Rheostats for use on D. C. current.

Write for Bulletin No. 10

The France Mfg. Co.
Cleveland, Ohio



ARE YOU AN EXPERT?

EVERY man must be an expert in his line to attain success, but he must have the necessary equipment to be an expert. The NIEHOFF DEFECTOMETER opens up a big field for dealers and garage men on electrical repair work. It is something you need to locate shorts in armatures, condensers, slip rings, etc. It finds the trouble quickly and doubles your efficiency. We also make thoroughly tested condensers, slip rings, etc., and do perfect armature rewinding. Write for further information.

PAUL G. NIEHOFF & CO., Inc.
232-242 E. Ohio St., :: *Electrical Laboratories* :: CHICAGO

SMOOTH-ON



For Sale By Supply Houses

IRON CEMENTS Nos. 1 and 3

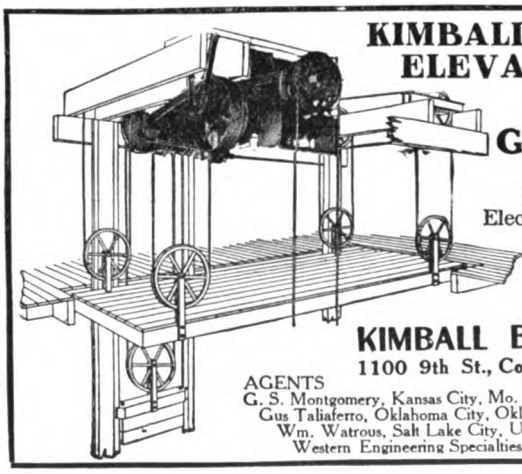
For Permanent Repairs on Automobile Motors and Parts

Repairs leaks in water jackets, boilers, tanks, screw-thread joints, flanged joints, etc., also for keeping nuts and bolts tight. Expands and contracts with the metal to which it is applied and not affected by heat, cold, water, gasoline or oil.

Complete Repair Package contains one 1-lb. can SMOOTH-ON Iron Cement No. 1, one 1-lb. can SMOOTH-ON Elastic Cement No. 3, one roll Tape, one 144 page Instruction Book. . . $2.00

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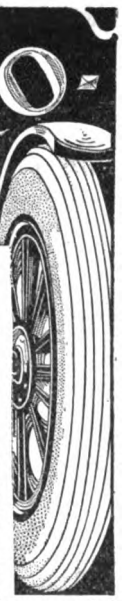
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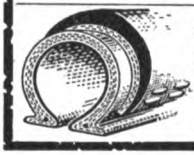
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32x4	4.75	8.00	10.00	3.20
33x4	5.25	8.25	10.25	3.30
34x4	5.50	8.50	10.50	3.40
36x4	5.75	8.75	11.00	3.50
34x4½	5.75	9.00	11.50	4.10
35x4½	5.75	9.25	12.00	4.25
36x4½	6.00	9.50	12.50	4.35
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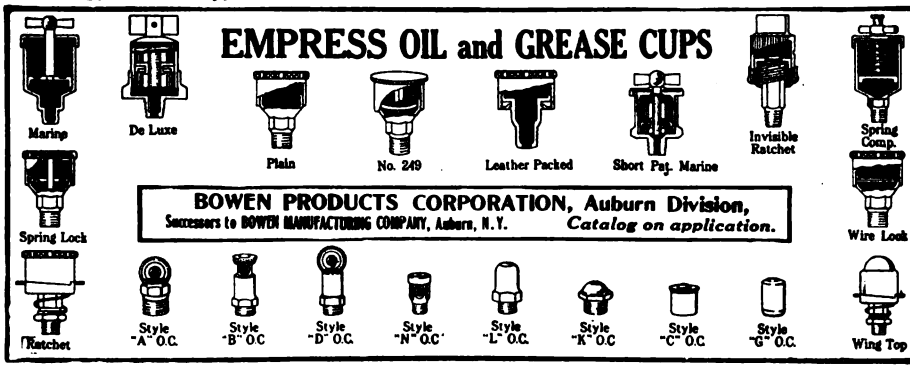


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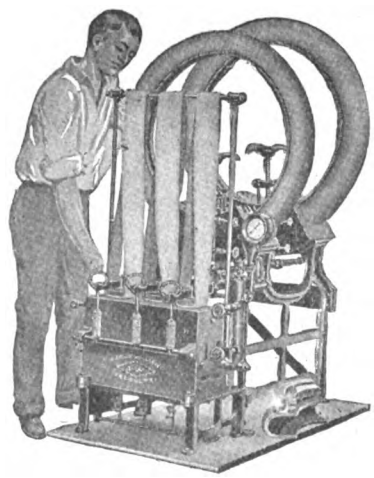
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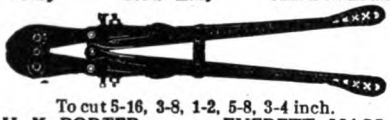
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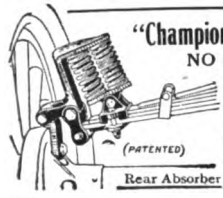
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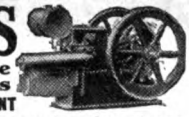
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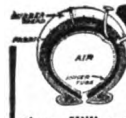
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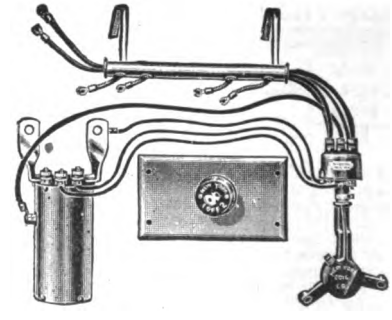
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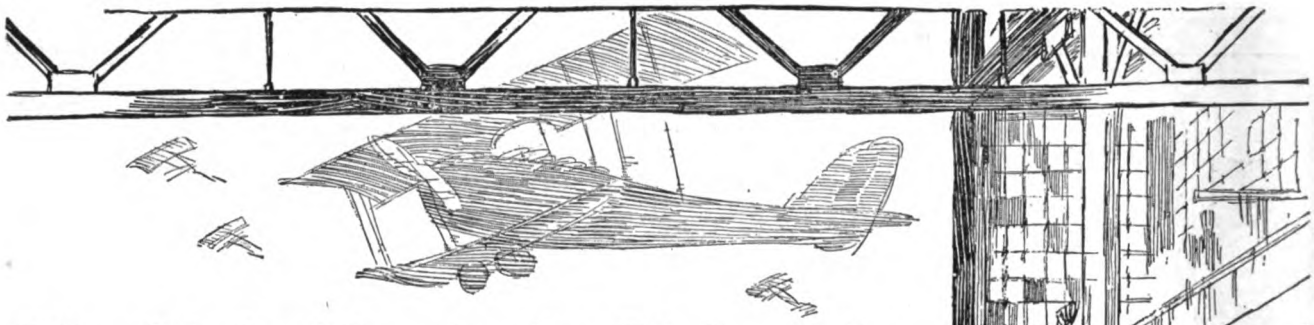
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The U. S. Employment Service is the official bureau of the Federal Government in charge of the distribution of labor. The President has declared that it is the official agency for recruiting and distributing unskilled labor for war work.

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"Industry plays as essential and honorable a role in this great struggle as do our military armaments. We all recognize the truth of this, but we must also see its necessary implications—namely, that industry, doing a vital task for the Nation, must receive the support and assistance of the Nation."

* * *

"Therefore, I solemnly urge all employers engaged in war work to refrain after August 1st, 1918, from recruiting unskilled labor in any manner except through this central agency [the U. S. Employment Service]. I urge labor to respond as loyally as heretofore to any calls issued by this agency for voluntary enlistment in essential industry. And I ask them both alike to remember that no sacrifice will have been in vain, if we are able to prove beyond all question that the highest and best form of efficiency is the spontaneous co-operation of a free people."

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It has over 500 branches throughout the nation, and 20,000 U. S. Public Service Reserve enrollment agents. Ask the local post office or newspaper for name and address of the nearest representative, or write to the U. S. Employment Service, Washington, D. C.

Those employers in war work who seek to get labor through their own or private recruiting agencies are interfering with the Government's machinery and preferring their interests to those of the nation. Only through strict compliance with the Government's program can the constant, restless shifting of labor from one war job to another, with the consequent diminution in production and efficiency, be prevented.

Above all, the Government urges every man engaged in war work to stick to his job until the Government recommends that he change. Any man not engaged in war work should put himself at the disposal of the nation by registering with the Public Service Reserve. This is a tremendously important duty! The war worker ranks with the fighter in the trenches. He will help beat the Hun.

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U.S. Dep't of Labor W.B. Wilson Secy.



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THE LITTLE RED SCHOOL HOUSE



We are teaching thousands the right way to make Automobile Repairs

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"Your paper is better on operating and repairing a car than all the other papers combined that I am taking. Your 'Trouble Department' alone is worth more than the subscription price."

From E. E. CLARK, North Carolina.

"I have had your magazine for a year and will not do without it as long as I can get it. I always look at the 'Trouble Department' the first thing. If a man has an automobile he can afford to pay ten dollars a year for the information he will get out of your magazine, if he cannot get it for less."

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Send us the names and addresses of several of your friends in a letter if you wish to get them in the little red school house for 3 months free.

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Gentlemen:—I am anxious to learn how to properly adjust automobile troubles and wish to take advantage of your experts' advice. Please send me copies of the *Automobile Dealer and Repairer* for three consecutive months, and it is understood that these will be mailed to my address absolutely free and without any obligation on my part.

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The Auto Specialty That Sells Itself

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100% efficiency is solving one of the most vexing problems of motoring.

Pontoklene removes tar like magic! Makes tar melt and run like the proverbial snowball in a real hot place. Is also a perfect grease and oil remover—restoring the original polish of a car without rubbing. Much better than gasoline for cleaning engines.

Successfully established wherever introduced by distribution of samples. Every sample makes a buyer.

Garages supply it to their car washers because it saves hours of time and insures clean work.

The empty can makes a fine reserve oil carrier.

Prices:—1/4 Gallon, $1.00—1/2 Gallon, $1.50

Quantity Discounts to the Trade.

Delivered free upon receipt of price if no dealer in your city can supply you.

Special Proposition to Dealers and Distributors.

Get Pontoklene in stock quick—before the road-tar season starts. We will help you introduce it. After that it sells itself. Write us today.

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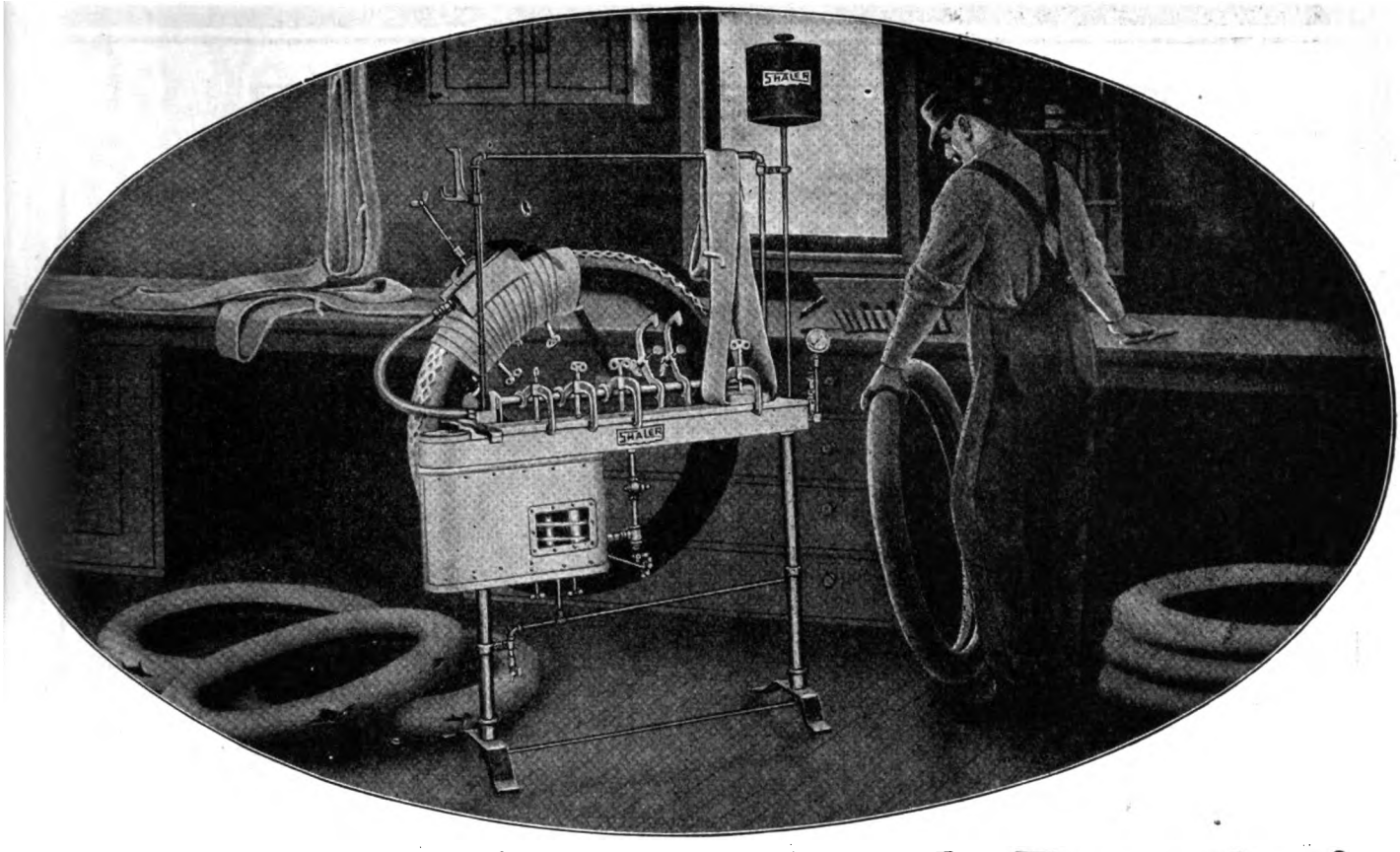
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8,000,000 Tires Need Repairs!

The yearly cost of *repairing* these tires is estimated at ONE HUNDRED MILLION dollars—the greater part of this huge sum goes to the aggressive garage men, accessory dealers and repair shops who are doing tire repairing!

Think what a field there is in tire repairing! In your own locality there are enough motorists to keep you busy—and how many more are passing every day? Every one is a customer—not merely for one job—but four or five repairs at one time!

SHALER Vulcanizer

For Repair Shops and Garages

Successful results are certain with the SHALER Vulcanizer. You don't need experience—just follow instructions—to turn out perfect jobs.

By the new SHALER Wrapped-Tread Method, casings are mended quicker, better and at less cost to you than with other vulcanizers using the old method.

The SHALER Vulcanizer has thermostatic heat control, which regulates the temperature automatically. This makes an explosion impossible, prevents overheating or undercuring the tire—and leaves you free to devote your entire time to repairing.

Any style or size of casing or tube can be repaired. The SHALER Vulcanizer occupies no more space than a bicycle, and can be moved about easily. Equipped for gas, gasoline or electricity—to suit your shop.

Large Capacity—Tubes and Casings

The SHALER Vulcanizer is absolutely high grade—designed for practical vulcanizing and intended for large volume of work. It handles six tubes and one casing AT ONE TIME—a total of 200 tubes and 12 casings in eight hours.

Figure out for yourself what this daily capacity of the SHALER Vulcanizer will mean! Consider the handsome profits it will *earn* for you—*every day in the year!*

Mail the coupon for our book telling all about SHALER Garage and Repair Shop Vulcanizers. It explains fully every detail of the vulcanizers—and tells all about the SHALER Money-Back Guarantee. Fill out and mail the coupon NOW—it will be your first step toward bigger profits.

C. A. Shaler Co., 807 Fourth Street, Waupun, Wis.

Oldest and Largest Manufacturers of Vulcanizers for Motorists and Repair Shops

Mail Coupon for Catalog

C. A. SHALER COMPANY
807 Fourth Street, Waupun, Wisconsin

Gentlemen: Kindly send me at once a copy of your catalog describing the SHALER Vulcanizer for Garages and Repair Shops, and containing a copy of your "Money-Back" Guarantee.

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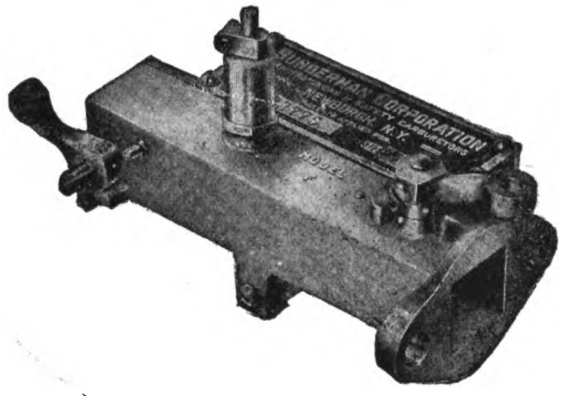
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SUNDERMAN

Vacuum Carburetor



Model F $6

For Ford, Metz and Saxon Four.

Model BB—for all other cars—without connection $8

With regular connection . . $10

With special connection . . . 12

Are You GUESSING at Your Mileage?

Find Out Definitely What You Are Getting

THE next time you fill your gasoline tank, take note of your speedometer reading. Put in 5 or 10 gallons, and when you need more gasoline take another speedometer reading to find out exactly how many miles you got from that 5 or 10 gallons of gasoline.

The Result Will Surprise You

When you actually see for yourself what you are getting, you will be surprised how much less it is than the mileage you believed you were getting.

This is a certainty, no matter what your car. Men who are calmly certain that they are getting 15 miles to the gallon discover they are actually getting 10 or 12 at most.

Here's the Remedy

If you believe you should get 15 miles from your car, equip it with a Sunderman Carburetor, and get 20 to 22.

The Sunderman Carburetor increases the mileage of any motor from 30 to 50%—and it hasn't made any difference whether the car was new and lively or old and decrepit. It is true of cars all the way from a Ford to the heaviest car on the road.

The Sunderman Principle Is Universally Successful

Many cars get mileage increases much greater than 50% when equipped with a Sunderman. We have many letters to prove this. You can prove it yourself by your own car.

The reason is the Sunderman mixing principle. By multiple jets, operating with the automatic creation of a higher vacuum, the gasoline is torn apart into the most minute particles, producing an infinitely fine vapor that gives more power—more drive—from a smaller amount of gasoline. That's the Sunderman principle simply stated.

It Gives Much Greater Power, Too

When you need power—in bad or sandy roads, on steep hills, etc., the Sunderman Carburetor responds for you as surely and resistlessly as the tank of modern warfare.

This extra power is a by-product of fine vaporization. As a natural consequence there is a much greater flexibility, a quicker pick-up, a faster getaway, less gearshifting, less carbon because of more complete combustion.

We Want You to Prove This for Yourself

Write in at once if you're a car owner—it's like money in the bank waiting for you. Let the Sunderman Carburetor begin to earn for you immediately.

If You're a Dealer, Listen

The music of the cash register will be more regular, sweeter and greater in volume if you are a Sunderman distributor. Be a live enterpriser—prove it by writing us now for our proposition.

We take care of all orders immediately upon receipt. Write NOW

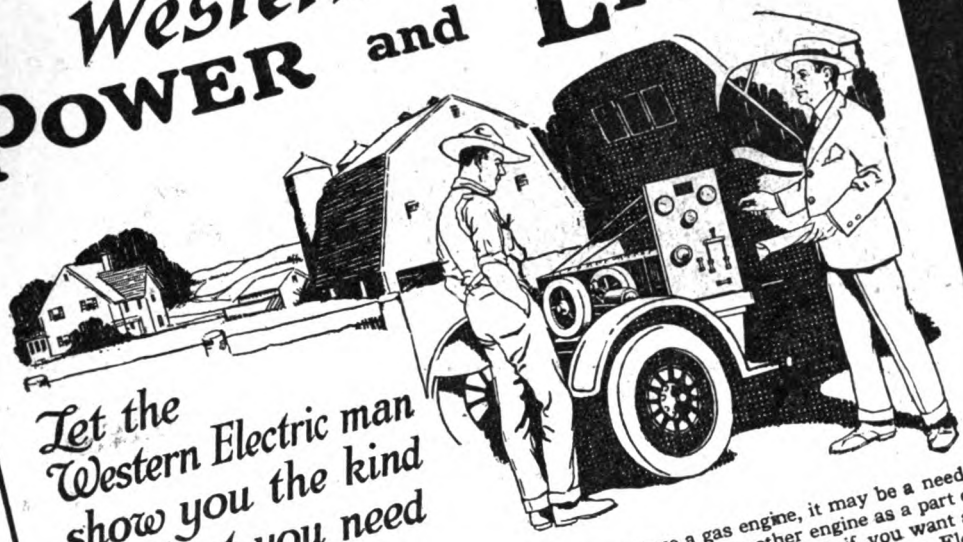
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DO YOU WANT TO BE THIS MAN?

Western Electric POWER and LIGHT



Let the Western Electric man show you the kind of plant you need

THERE is as much difference in electric light plants as there is in automobiles or gas engines. No one type is equally suited to all farms, and your power and light requirements may be different from your neighbors'.

Like every farmer, you want electric power and light, but you don't want an outfit either too large or too small for your needs. Start right! Get all the facts! *Let the Western Electric man show you the kind of plant you need!*

Our business is bigger than the mere selling of any particular electric plant. We sell electricity for the farm. There are all sizes and types of Western Electric outfits. We are not forced by policy to sell one type for every purpose. We can sell you an outfit with or without a gas engine.

If you have a gas engine, it may be a needless expense to buy another engine as a part of an outfit. On the other hand, if you want an outfit with built-in engine, the Western Electric man will tell you about a new outfit of this type ready for delivery this Fall. In any case, it is just a matter of fitting our equipments to your needs.

More than forty years of electrical manufacturing experience is back of all these Western Electric Power and Light Outfits.

Make your entire equipment "Western Electric." You can get Western Electric Motors, Water Systems, Milking Machines, etc., to save labor on the farm; as well as Irons, Vacuum Cleaners, Washing Machines and other electrical helps to save time and labor in the home.

There is a Western Electric man near you. Mail the coupon for Booklet No. , and we will tell him to get in touch with you.

WESTERN ELECTRIC COMPANY
INCORPORATED

500 South Clinton Street, Chicago, Ill.
114 Third Street, Minneapolis, Minn.

WESTERN ELECTRIC CO., Inc.
I want to know more about your electric plants, so please send your book No. , "Power and Light."
Name
P. O. Address State
County

This advertisement will be in Country Gentleman on August 31st, and in 23 other farm papers.

Mail the coupon—if you want to be the man →

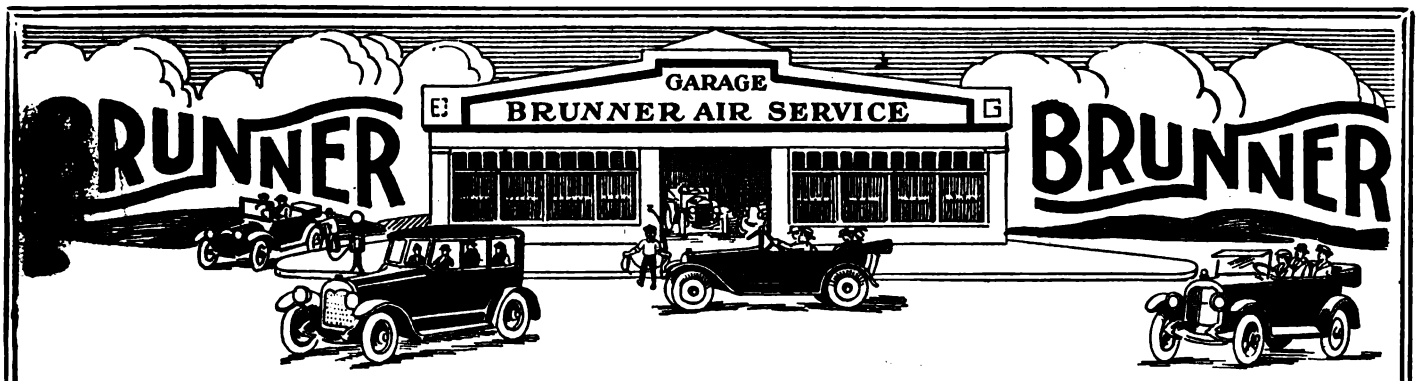
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INCORPORATED
195 Broadway, N. Y. City
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Dept. 721
Kindly let me know more about the Power and Light sales agency proposition.

A. D. R. Aug.

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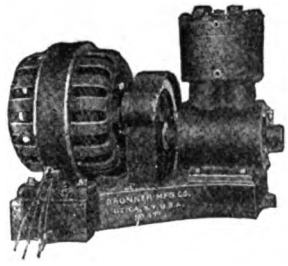
WE USE A BRUNNER AIR COMPRESSOR
FREE AIR
FOR YOUR CONVENIENCE

The confidence of the motoring public is the garageman's greatest asset. The average motorist knows that Brunner Service is absolutely dependable and has confidence in the Brunner Equipped Garage.

Without the confidence of the motorist no garage can be successful because the present day motorist expects and demands high class service and knows where to get it—he knows that the garageman who places Brunner Air Service at his disposal is a live wire with the interest of the motoring public at heart, and when he sees the Brunner Sign on a garage he has confidence in that garage and stops for air and such supplies or service as he may be in need of, and he never has to drive on his way disappointed.

IF YOU INSTALL A BRUNNER AIR COMPRESSOR

You will find it just as dependable and satisfactory as thousands of other garagemen have found it for years. You will find it a wonderful time saver, and you will find it to be exactly as represented in every way.



You will also find the trade of the Brunnerwise motorist both satisfactory and profitable for the reason that he appreciates good service and is a good spender—he is a firm believer in reciprocity—he follows the Brunner Sign.

When you buy a Brunner Air Compressor you buy a quality product which has always been sold on its merit without resort to advertising promises of impossible performances, you receive it with the guarantee of both the manufacturer and the Brunner Jobber who takes your order that it will do the work for which it is recommended and be found exactly as represented—you cannot possibly go wrong with a Brunner Air Compressor.



"The Motorist who is Brunnerwise knows Brunner Service Satisfies"



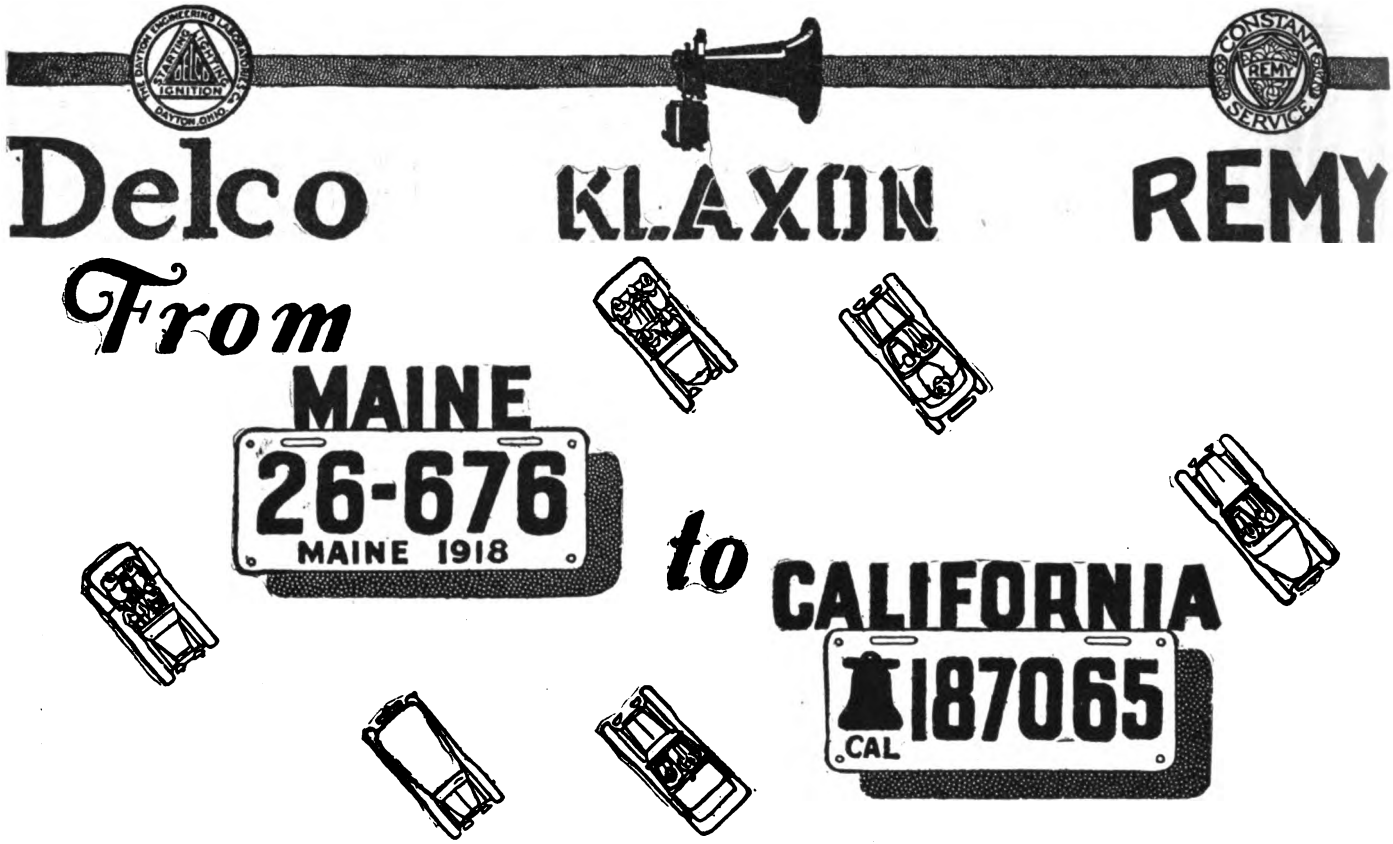
Write for No. 15 Catalogue and the name of the Brunner Jobber covering your territory. Get acquainted with the Brunner line.

BRUNNER MANUFACTURING COMPANY

General Office and Plant
UTICA, N. Y.

Cincinnati Branch
CINCINNATI, OHIO

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Factory Branches for Service

Now there is a nation-wide service organization for Delco, Klaxon and Remy electrical equipment—United Motors Service Incorporated.

This organization consists of—

Six branches equipped to render service on Delco, Klaxon and Remy—

Five branches giving service on Remy equipment only—

Fifteen service stations for Remy—

66 service stations for Klaxon—

This means that wherever you are located there is a United Motors Service Incorporated Branch or Service Station in your locality where you can get direct factory service on Delco, Klaxon and Remy electrical equipments.

Not only is this service convenient—it is official and efficient.

You are guaranteed absolutely genuine parts—United Motors Service Incorporated is the service division of the United Motors Corporation of which Delco, Klaxon and Remy are subsidiary units.

United Motors Service Inc. branches in the following cities giving service on Delco, Klaxon and Remy:

Kansas City
Chicago
Detroit
Los Angeles
San Francisco
New York

15 cities in which there are United Motors Service Inc. service stations for Remy
66 cities in which there are United Motors Service Inc. service stations for Klaxon

MOTORS SERVICE
TRADE MARK

United Motors Service Inc. branches in the following cities at present rendering service on Remy only:

Denver
Minneapolis
Cleveland
Boston
Atlanta

UNITED MOTORS SERVICE

INCORPORATED

General Offices: **Detroit, Mich.**

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IT'S EASY TO SEE

why Dixon's are the best lubricants. When bearing surfaces are coated with

DIXON'S GRAPHITE Automobile LUBRICANTS

metal-to-metal contact is prevented by the superior, especially selected flake graphite grease which forms a film that outlasts any other kind of lubricant.

Write for Dixon's Dealer's Deal No. 184-G

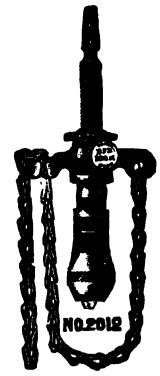
Made in JERSEY CITY, N. J., by the

JOSEPH DIXON CRUCIBLE CO.

ESTABLISHED 1827

"Red Devil" Chain Drills

Fast Sellers Good Profits



The demand for "Red Devil" Chain Drills is growing daily.

Some reasons why:

They have an automatic feed adjustable to any pressure, like a drill-press. Friction is minimized by hardened tool-steel ball bearings and races. Thread is machine-cut from the solid rod, not cast. Have 3-ft. polished steel chain, extra lengths if required. Heavily nickel-plated Universal chuck holds round or square shank drills and bits 3/16" to 3/8"; alligator jaws of forged tool-steel.

Unconditionally guaranteed against defects in workmanship and to give absolute satisfaction.

If you are not already selling them, write at once for our proposition.

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8,104	Ford Dealers, U. S	18.50 or 3.00 per M.
8,519	Truck Dealers, U. S. (Showing make of truck handled)	12.00 or 3.00 per M.
150,000	Truck Owners	7.00 per M.
5,400	Truck Owners in Chicago	15.00 or 3.50 per M.
4,943	Garages, U. S	75.00 or 2.50 per M.
55,967	Auto Supplies, Retail, U. S	90.00 or 2.50 per M.
45,054	Repair Shops	75.00 or 2.50 per M.
404	Auto Manufacturers	3.00
73,674	Auto Dealers, Garages, Supplies and Repairs in one list, no duplicates	$125.00 or 2.50 per M.
1,505	Auto Supply Jobbers	5.00

(All lists typewritten and show financial ratings, and are 1918.)

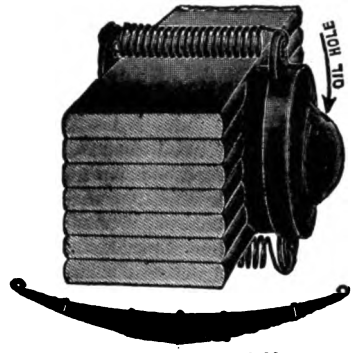
COMPLETE LIST AUTO OWNERS AND FORD OWNERS, $2.50 PER M.

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STERLING SPRING LUBRICATORS



Inconspicuous Easily Attached
No Tools Required

AUTO SPRINGS NEED OIL

Oil pads and cases firmly held by strong coil springs and *they won't slip or fall off.* Easily and conveniently re-oiled without removing. Sterling Oilers insure perfect *automatic* lubrication.

PRICE 25c EACH

Ford Set $1.00

One size fits all makes of cars.

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If you cannot obtain them from your source of supply, write us.

THE STERLING MANUFACTURING CO., (Lubricator Dept.) 307 Frankfort Avenue, Cleveland, Ohio



SCAIFE COPPER-BRAZED AIR TANKS

are positively guaranteed to hold air indefinitely without loss of pressure.

CAUTION

Do not confuse Scaife Copper-Brazed Tanks with the cheap Welded or Soft-Soldered Tanks made by others.

We Also Manufacture

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Send for Catalogues.

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NEW COOLING SECTIONS FOR RADIATORS.

A new square tube honeycomb cooling section will make your radiator new again.

Ask us for information.

ROME TURNEY RADIATOR CO.,

Whitesboro Street ROME, N. Y.

Made from Oil-Tempered Spring Steel Wire



They Remove Carbon Where Others Will Not

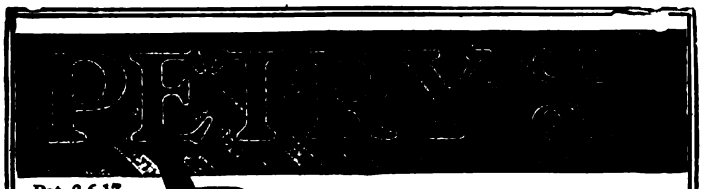
PATENTED MARCH 28, 1916



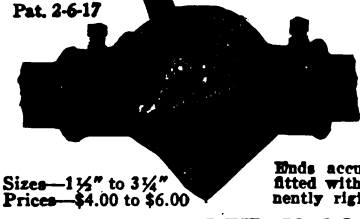
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Price Per set, $1.50. Ask Your Dealer or Write

Flexible Carbon Scraper Co. 1421 W. Washington St. Los Angeles, California



Pat. 2-6-17



Gases expelled to the rear through patented flared opening, prevents all back pressure. Lever has seven adjustments, which make easy installation. Spring is away from the body of Out-out, does not absorb heat, has a simple tension adjustment and easy action, no strain on the exhaust pipe.

Sizes—1¼" to 3¼"
Prices—$4.00 to $6.00

Ends accurately machined for pipe size and fitted with set screw, which insures a permanently rigid installation.

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Insulated Air-Cooled Flanges Prevent Marking Tires

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$165.00



One of the 60 Kinds in Style

From 90c up

We teach Tire Repairing FREE OF CHARGE at factory or by mail.

Extra Ply Tires

Give More Miles at Less Cost

"C O G" & "Wrapped" Treads contain 25% more Fabric and Rubber than Standard.

More Fabric Means Less Blowouts— More Miles

New 80-Page Catalog on Request

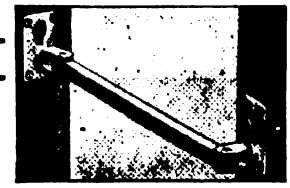
Exclusive Tire Distributors are Repeating Sales

For Price-Lists—Repeat Sales System

WRITE DEPT. "H" CHAS. E. MILLER ANDERSON, IND., U. S. A.

HURRICANE HOOK

Motor Car Door Ventilator



AN INGENIOUS DEVICE

which promotes the motorist's comfort in summer Its simplicity, utility and practicality in permitting good ventilation are bound to create a demand.

The Hurricane Hook is a 5-16 in. rod about 6 in. long. One end fastens to the door, the other to the body. It holds the door open wide enough to let in the air, but not far enough to extend beyond the runningboard. It fits flush, there are no projections to catch clothing, and it will not rattle or chatter. When not in use it can be lifted off or left hanging down. It is mechanically correct, and adjustable to all makes of cars.

Prepare now for the big demand warm weather will create. Price only 60 cents, boxed individually. The discounts are very liberal. Immediate shipments. Write or wire today.

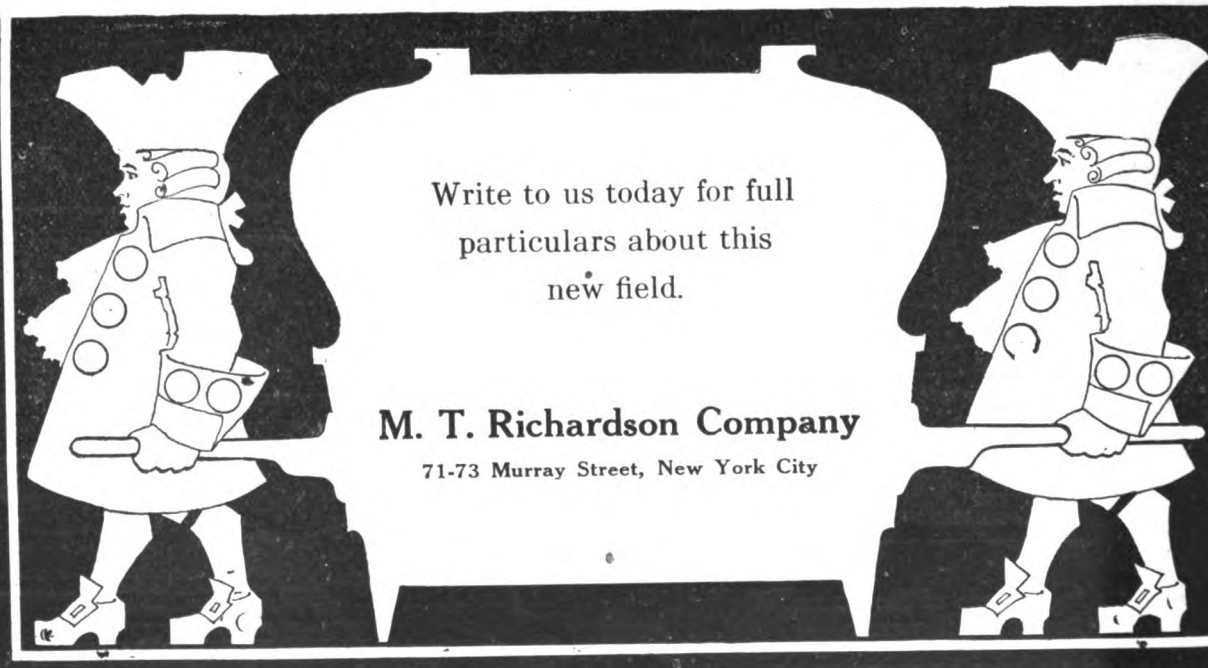
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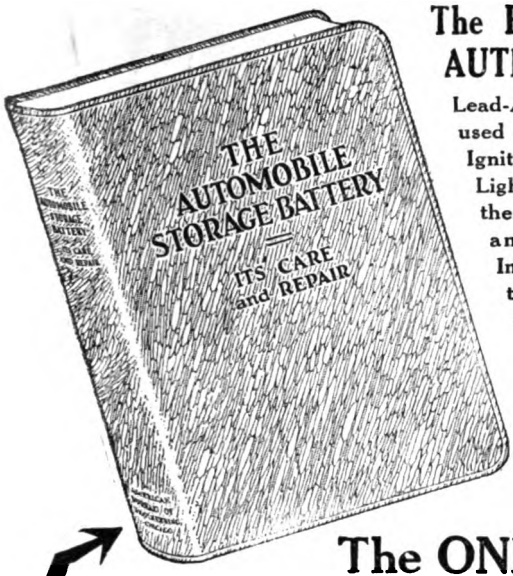
Write to us today for full particulars about this new field.

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Lead-Acid Batteries used for Automobile Ignition, Starting and Lighting, covering the theory of design and construction. In a simple way tells just how to repair, restore and rebuil to secure full power and efficiency.

The ONLY

BOOK that deals extensively of all repairs that can be practically made, written by an experienced engineer with the aid of many expert repairers.

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from every view-point. The novice can read and understand, as well as the engineer. The most complete information ever published. Invaluable for repairers in every battery garage or service station.

Special Instructions for different types of batteries in general use.

The book contains 280 pages, with 186 illustrations, graphs and charts, the section devoted to rebuilding has 131 cuts, many from special photographs, detailing repair methods.

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Handsomely Bound in Flexible Leather Cover, $5.00

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You may send me at once, one copy of The Automobile Storage Battery, for which you will find enclosed {Check, Money Order, Draft,} for Five ($5.00) Dollars.

It is understood that if the book is not entirely satisfactory to me, I may return it within five days at your expense and you will refund my money. I am the judge as to satisfaction.

Name .....

Firm.....

Address.....

Service

CAR owners will generally estimate the quality of your service by the quality of the product you sell.

Satisfaction to car owners—satisfaction and profit to dealers—that is the ultimate aim of Harvey Service.



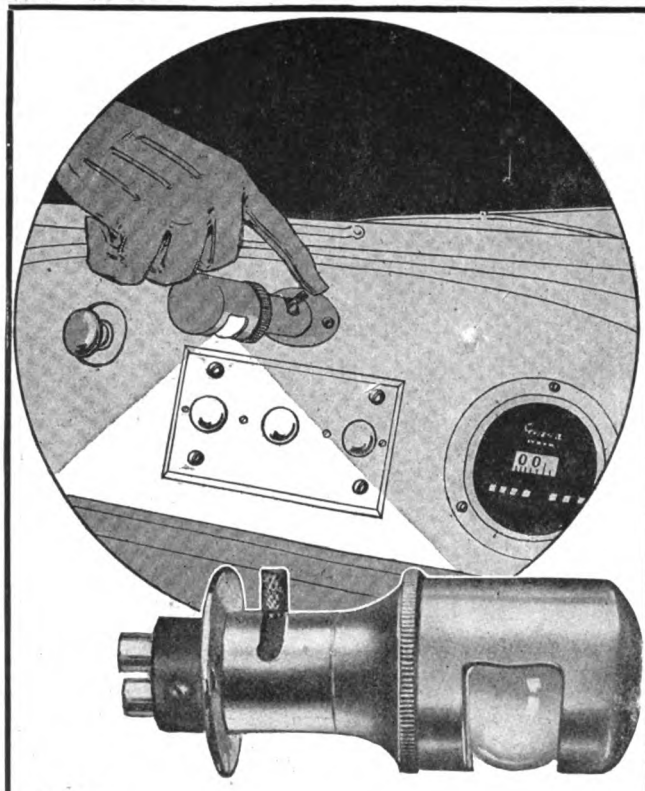
PRACTICALLY UNBREAKABLE

THERE'S A HARVEY JOBBER NEAR YOU
Our new catalogue giving Complete measurements of over 900 Styles of Springs is yours on request

HARVEY SPRING & FORGING CO.

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CONNECTICUT
"P S" DASH LAMP

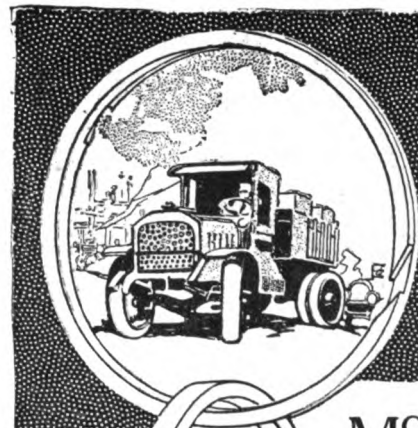
This is the most modern type of Dash Lamp on the market—a complete piece of equipment, better in every way than the ordinary dash lamp in that its control switch is incorporated in it. This obviates the necessity of an extra controlling switch and a more or less involved scheme of wiring.

It is substantially made, heavily nickeled and beautifully finished.

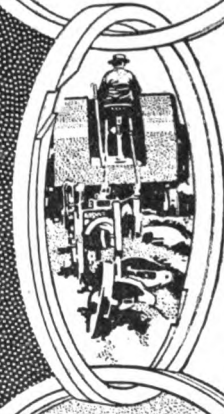
People are quick to appreciate the superior practicability of such a lamp and it finds a lively sale with all classes of motorists.

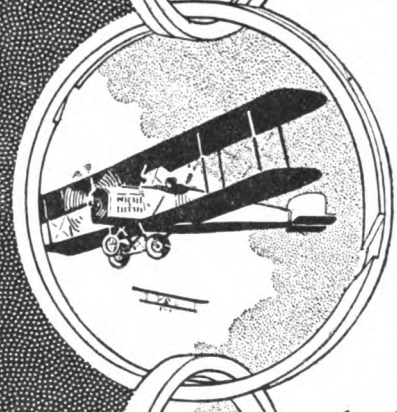
Price, without bulb, 75c

CONNECTICUT TELEPHONE & ELECTRIC COMPANY
MERIDEN, CONN.



New chances in old motors







MORE than ten million motors now in use. Hundreds of thousands are wasting power and gasoline because of leaky piston rings. They've got to be equipped with new piston rings. What *make* of ring? — the Inland.

It makes money for you—it saves money for the owner. Its spiral cut is patented—can't be duplicated in other piston rings. No gap—absolutely gas-tight. Equal width and thickness—greatest strength and durability. Easy sales anywhere—known the world over.

Over
2,000,000 in use
in "all branches of the Service" — automobiles, tractors, trucks, airplanes, motorboats, etc.

INLAND
1 PIECE PISTON RING



325 jobbers sells Inlands—ask yours

Inland Machine Works
802 Mound Street, St. Louis, Mo.

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"NORMA"

"NORMA" PRECISION BALL BEARINGS

(PATENTED)

The difference in price between an ordinary ball bearing and the best ball bearing, is never large. At most, it is but the tiniest fraction of a per cent of the total cost of a car or truck. But the difference in the service rendered may be tremendous —may mark the distinction between satisfaction and dissatisfaction.

"NORMA" Precision Bearings are the standard bearings in the high-grade magnetos and lighting generators because the makers of these accessories know from actual experience that the "NORMA" price is a premium on the safest insurance against bearing troubles.

Be Sure—See that Your Electrical Accessories are "NORMA" Equipped

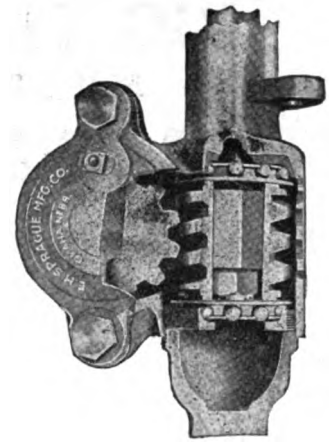
THE NORMA COMPANY OF AMERICA

1790 BROADWAY NEW YORK

Ball, Roller, Thrust and Combination Bearings.

"NORMA"

For FORD Cars



Sprague

WORM STEERING GEAR

for Fords

Dealers, Read This!

Every Ford user knows his car needs stronger steering equipment—something to get him out of the ruts; prevent cramping and upsetting; hold to the road; relieve the strain on the arms, etc.

You can sell the Sprague Worm Steering Gear under our guarantee of money back if the user is not satisfied.

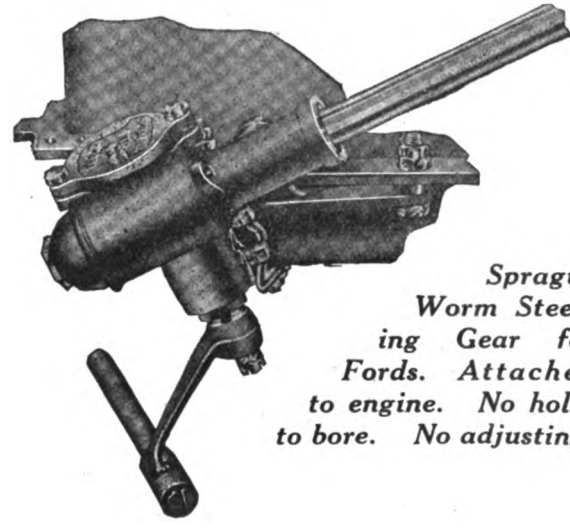
Ball bearing, floating shaft model. Made from high point steel; housing of malleable iron. Better worm steering gear than used on many higher priced cars.

Sells at $15. You make liberal profit, also additional charge (usually $2.50) for installing.

Get them from your jobber or direct. Write us for full information, advertising matter, etc.

You should easily sell this gear to 90% of the Ford owners in your community.

E. H. SPRAGUE MFG. CO., Dept. 14, Omaha, Neb.



Sprague Worm Steering Gear for Fords. Attached to engine. No holes to bore. No adjusting.

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BIG TIRE PROFITS

FOR DEALERS WHO SELL

KIMBALL TIRES

Read This, Mr. Dealer:—

Don't you want to make some real tire money? Then stop handling a few high priced tires that sell slowly and tie up your capital. Meet the cut-rate tire dealers on their own ground. Sell new clean firsts at the prices others get for seconds. Do a big business and turn over your capital several times a year.

KIMBALL TIRES are built to meet the demand for *good* low priced tires. Big dealers in New York, Chicago and other large cities are making more money on this kind of tires than they can make on high priced goods. Why don't you do the same?

There is room for a live KIMBALL dealer in every city and town in the United States. We allow only one dealer in each territory to sell KIMBALL TIRES. Many exclusive KIMBALL dealers are now doing a big business but there is still choice territory to be had. But it is going fast.

Get in touch with us. Send sample order at once. We guarantee our tires to be new firsts and will refund your money if tires are returned in five days in the condition in which they were received. Don't delay.

THE PRICES SPEAK FOR THEMSELVES

	Non-Skid	Tubes
30x3	$9.05	$2.10
30x3½	11.05	2.20
32x3½	13.70	2.35
32x4	18.00	3.20
33x4	18.55	3.25
34x4	19.50	3.35

Do you want Clincher or Straight Side?

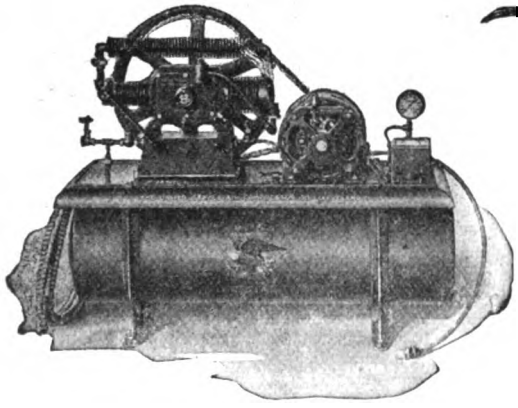
Don't delay. Mail your order today.

The Kimball TIRE & RUBBER CO.

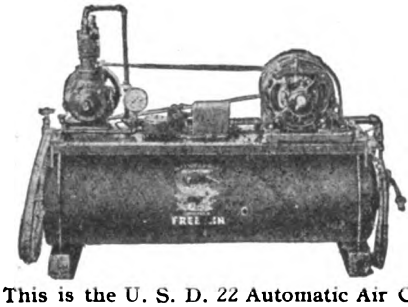
Dept. C **1467 Michigan Avenue CHICAGO**



"Straight Side" Type shown above. Also made Clincher Type



This is the U. S. De Luxe Automatic Air Compressor, leader of the Two-Stage line, which comprises 17 numbers with capacities from 4 to 21 cubic feet per minute.



This is the U. S. D. 22 Automatic Air Compressor, leader of the Single-Stage line, comprising 4 numbers with capacities from 1½ to 21 cubic feet per minute.

Machines of Many Features

EVERY United States Air Compressor is equipped with an efficient device to separate oil from the air; and with thousands of machines in constant use for many years, we have not received a single complaint from this source. We believe the least a purchaser can expect is a machine that will deliver air free from oil, and because of this fact, we do not consider it a matter worthy of extensive exploitation.

The United States Air Compressor was the first machine to contain a Patented Automatic Unloading Device which eliminates the need of starting a motor against pressure and thereby avoids the cause of burned out motors and the attending trouble.

Any unit of the 21 comprising the United States line, contains more refinements and improvements that any similar machine.

We ask prospective purchasers to examine U. S. machines from every possible angle and to compare them, point for point, with others. We ask you to buy them only when you are convinced they contain more points of merit than you can obtain in others. In buying air compressors, don't be mislead by comparatively unimportant argument, but go "beneath the surface" as a mechanic, and demand quality for your money.

The U. S. catalogue, describing both Two-Stage and Single-Stage Compressors in detail, will be sent upon request. Send for it today.

TEAR OUT AND MAIL
Send catalog advertised in Automobile Dealer & Repairer to address in margin

The United States Air Compressor Co.

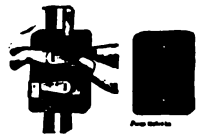
6536 Carnegie Ave., Cleveland, Ohio

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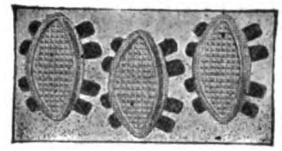
"RICO" AUTO SPECIALTIES



UNIVERSAL EXTENSION PEDAL
One Model for all Cars.
In a class by itself.



ADJUSTABLE PEDAL PADS
Mechanical Adjustment.
Two Styles for all Cars.



FORD PEDAL PADS
Fit all Ford Models. Outclass and Outwear all others. Big Sellers.



REAL CHINA BRISTLE AUTOMOBILE CLEANING BRUSHES.
Without a Rival.

LIBERAL DISCOUNT TO THE TRADE

RICH MFG. CO. 1777 BROADWAY NEW YORK

"HEXALL" SOCKET WRENCH No. 5

The intelligent dealer knows that survival in business basically rests on REAL—not pretended values.

A Sedgley Wrench never fails to meet UNCONDITIONALLY the severest requirements of any service.

10" Handle made from ½ inch Hexagon Steel, 7 Hexagon Sockets, with same range as No. 2 Set.

Sockets pack neatly on the handle when not in use. Friction Ball prevents them from falling off. Can be used as an extension with wrench on short end.

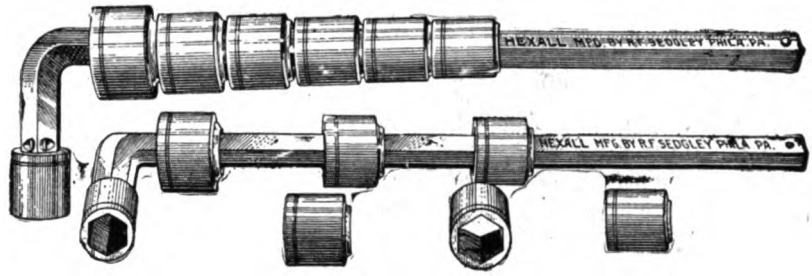
Weight 21 ounces.

"Break any Sedgley Wrench and we repair it—no charge"

SEND FOR NEW CATALOGUE

R. F. SEDGLEY

2311-13 North 16th Street, Philadelphia, Pa., U. S. A.

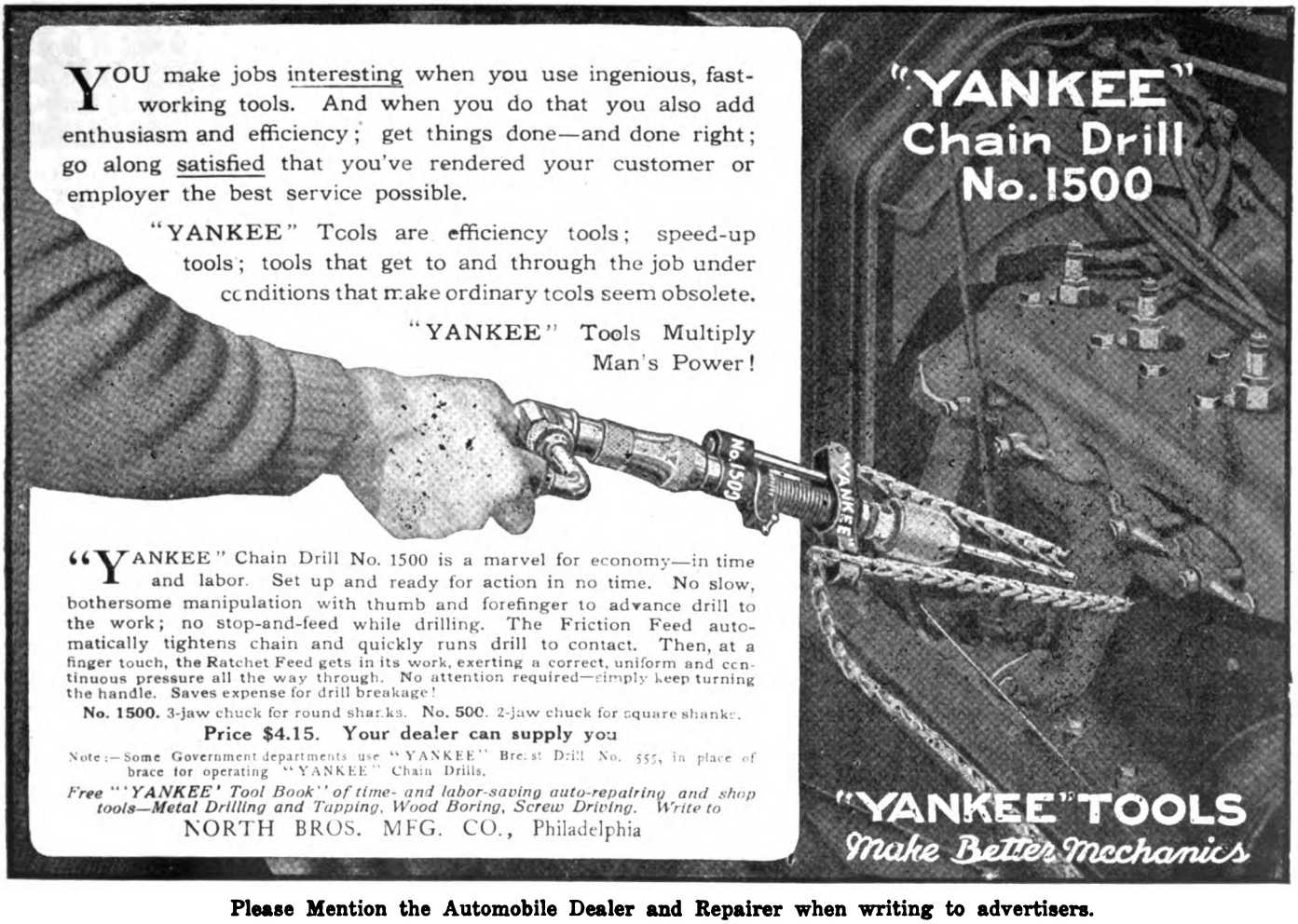


Pacific Coast Representatives: McDONALD & LINFORTH, San Francisco, Cal.

YOU make jobs interesting when you use ingenious, fast-working tools. And when you do that you also add enthusiasm and efficiency; get things done—and done right; go along satisfied that you've rendered your customer or employer the best service possible.

"YANKEE" Tools are efficiency tools; speed-up tools; tools that get to and through the job under conditions that make ordinary tools seem obsolete.

"YANKEE" Tools Multiply Man's Power!



"YANKEE" Chain Drill No. 1500 is a marvel for economy—in time and labor. Set up and ready for action in no time. No slow, bothersome manipulation with thumb and forefinger to advance drill to the work; no stop-and-feed while drilling. The Friction Feed automatically tightens chain and quickly runs drill to contact. Then, at a finger touch, the Ratchet Feed gets in its work, exerting a correct, uniform and continuous pressure all the way through. No attention required—simply keep turning the handle. Saves expense for drill breakage!

No. 1500. 3-jaw chuck for round shanks. **No. 500.** 2-jaw chuck for square shanks.

Price $4.15. Your dealer can supply you

Note:—Some Government departments use "YANKEE" Breast Drill No. 555, in place of brace for operating "YANKEE" Chain Drills.

Free "'YANKEE' Tool Book" of time- and labor-saving auto-repairing and shop tools—Metal Drilling and Tapping, Wood Boring, Screw Driving. Write to

NORTH BROS. MFG. CO., Philadelphia

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WAR-TIME THRIFT and RISING TIRE PRICES

MEAN MORE AND MORE SALES OF

ADAMSON

VULCANIZERS

THE ONLY COMPLETE LINE

THIS YEAR motorists are learning as never before to keep their own tires and tubes repaired to yield the utmost mileage at the lowest possible cost. Patriotic Thrift and Economy demand this.

Adamson Vulcanizers best meet this demand *because:* There's an Adamson for every repair a motorist can make;—every model will use common gasoline, always easy to get and sure in its results;—they are so easily operated as to encourage their frequent use;—and finally, Adamsons are the least expensive to buy and use.

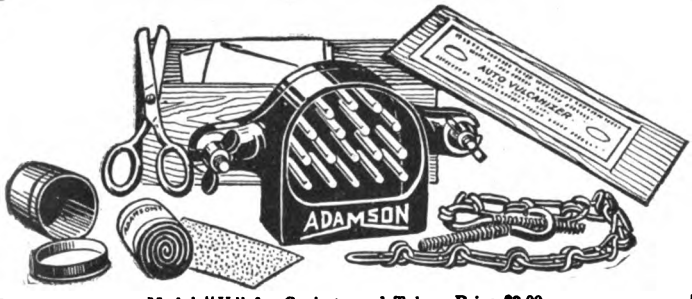


$1.00

Model "E" 5—Minute Tube Vulcanizer.

REPAIR TUBE PUNCTURES

in 5 minutes, anywhere. Pour a measure of Adamson Dry Fuel into the Vulcanizer, touch a match, and the fuel burns with a hot glow—no flame—vulcanizing the patch permanently in five minutes. Use gasoline instead of Dry Fuel if desired. Extra can of Dry Fuel 50c.; extra box of patches 25c.



Model "U" for Casings and Tubes, Price $2.00.

KEEP CASINGS MENDED

by vulcanizing cuts in tread and side-wall; prevent moisture and dirt from getting into the fabric, rotting it and causing blowouts. Conserve tires for thousands of miles more service. Use while tire remains on wheel. Make also ordinary repairs on tubes.

OTHER ADAMSON MODELS

Include Model "T" for repairing inner tubes only, priced at $1.50; and Model "S" for private garage and repairshop use, vulcanize repairs up to 12 inches, price $12.00. Adamson Repair Gum is a special compound for best results with any portable vulcanizer.

SOLD BY ALL JOBBERS

Write us today for catalog, store displays and copies of booklet, "Repair and Care of Tires."

ADAMSON MFG. COMPANY

EAST PALESTINE, OHIO

We also make Adamson Ford Brake Shoes, Lined and Unlined

S-M-C

Trade Mark Registered U. S. Patent Office

Maximum service from every car—and maximum economy in operation—are the needs of the hour. Dependable brake action is a big factor in both.

S-M-C
ASBESTOS BRAKE LINING

is your best assurance of dependable brake action, in every emergency.

Look for the letters **S-M-C** on every roll, before you buy brake lining—they mean **"Safety Made Certain,"** and enduring dependable service. S-M-C is closely woven of finest asbestos, with friction wire interwoven; then compressed to exact size by massive steel rollers after being treated with the **S-M-C** Special Compound, which resists heat, water, oil and gasoline.

MADE IN ROLLS OF ALL WIDTHS UP TO 6 INCHES

Dealers, Write for Quantity Prices

STAYBESTOS MFG. CO.

5541 Lena Street **Philadelphia, Pa.**

The Modern Factory—Equipped to Make All Types of Brake Lining and All Widths Up to 6 Inches

aranteed for ,000 Miles



EVERY Brictson Tire is sold under a specific 10,000 mile written service guarantee. This guarantee is the longest and strongest ever put behind a pneumatic tire and is a positive protection to every purchaser.

"Absolutely Puncture Proof"

Brictson Tires are puncture proof, and proof against blowouts, skidding, rut wear, rim cuts, and can't be damaged by oil or gasoline. Wonderful resiliency, easy riding qualities as well as economy commend them to every car owner.

The Big One-fourth Retread Feature

Should the tread surface wear out after 10,000 miles of service you can get a new retread for one-fourth the original cost of the tire, instead of buying a new tire, and you keep the remaining three-fourths in your pocket. With ordinary service the Brictson Tire should run enough beyond the 10,000 miles to require one or two extra retreads. The more retreads you use the cheaper your service.

FREE TRIAL OFFER

To convince you the Brictson Tire will give satisfaction TRY THEM ON YOUR CAR AT OUR EXPENSE. Write today for this Free Trial Offer, a copy of our guarantee and full information about Brictson Tires.

BRICTSON MFG. COMPANY

Dept 188

1015-24 Woodmen of the World Building

OMAHA, NEBRASKA

Brictson Pneumatic Tires

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Money Just Rolling In



To Toliver Dealers

2983 Men

are now handling Toliver Tubes, Tires and Accessories—they are rapidly getting a *stranglehold on the business in their community*, they are forging to the front and *making big profits.*

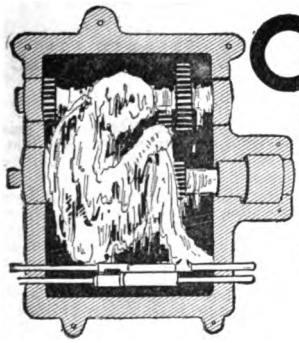
Toliver Products are fast becoming famous—but even more important to you is the fact that we give cooperation and sales-assistance to our hundreds of representatives which practically *guarantees their success.*

We teach you how to start
and
We teach you how to stick

You don't have to have any capital—you can start small and grow big—we help you toward success. Certainly you can do what 2983 other men are now doing. This is the biggest opportunity that was ever offered you to get a quick start in the big tire and accessory business.

Don't let this opportunity pass. Write today for our Tube and Tire catalog—*and our Special Proposition.*

The Toliver Tube and Tire Co.,
847 Toliver Building, Denver, Colorado



Common Grease sleeps between rides

IT has to be melted before it has any lubricating value at all.

You don't have to melt

TRADE MARK REGISTERED IN
NON-FLUID OIL
UNITED STATES PATENT OFFICE

No sir, it starts when the car starts and is always ready to follow gears as soon as they start moving.

And it cushions gears perfectly against the prying force of gear shifting, increasing life of gears and adding to the mileage of each gallon of gas.

The best part of it is that you actually get better lubrication at less cost per month.

Most dealers can supply you with NON-FLUID OIL. It comes in orange cans. Use "KOO" special grade for gears. "KOOO" for all bearings.

NEW YORK & NEW JERSEY LUBRICANT CO.
165 BROADWAY, NEW YORK

REX Automobile Jack for Garage and Private Service



REX JACK COLLAPSED

Engineered to Perfection

High Powered, Quick in Action and made to last regardless of Hard Usage.

Because

Constructed entirely of high grade Heat Treated Steel and Malleable.

It rolls on four good strong wheels and a mere boy can lift any car.

Because

As you start to lift, the REX rolls under instead of remaining stationary.

Two in One

See the nose which is put there to hook under the axle and Rex Jack it up when the wheel is off.

Safe

No Springs, No Cogs, No Ratchets, but Automatically locks at any height, thus Insuring Safety at all heights.

Glides under the lowest part of any car even though they be equipped with Bumpers or Extra Tires, and raises to a height of 20½ inches without blocking.

Friends

Thousands in use and not a single complaint but Hundreds of Compliments. As a Time Saver it has no equal and will pay for itself any busy week. Ask any user.

Stocked by your Accessory Jobber.

Weight 47 lbs. List Price $20.00.

SOME DAY YOU WILL BUY THIS TIME SAVER



REX JACK RAISED

B. & M. Manufacturing Co.
5810-14 So. Wood St. CHICAGO, ILL.

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WITH THE ARRIVAL OF

Superford HONEYCOMB RADIATORS



For Ford Pleasure and Commercial Cars

The FORD OWNER is now assured of a HIGH-CLASS RADIATOR, carefully constructed, that will render service efficiently and greatly improve the operation of the motor.

These Radiators Are Built with:

The Same THOROUGHNESS
The Same THOUGHT
The Same CARE
The Same MATERIAL
The Same SKILLED ARTISANS

That Have Made the Name "SUPERFORD" Synonymous with Quality and Dependability in Motor Cooling. Radiator Units Are Made of Brass.

MODEL No. 16-F
For 1909 to 1916 Ford Cars
Made like the 1918 in two units, with black detachable casing.
Price Each, $28.00

SUPERIOR AUTOMOBILE PRODUCTS

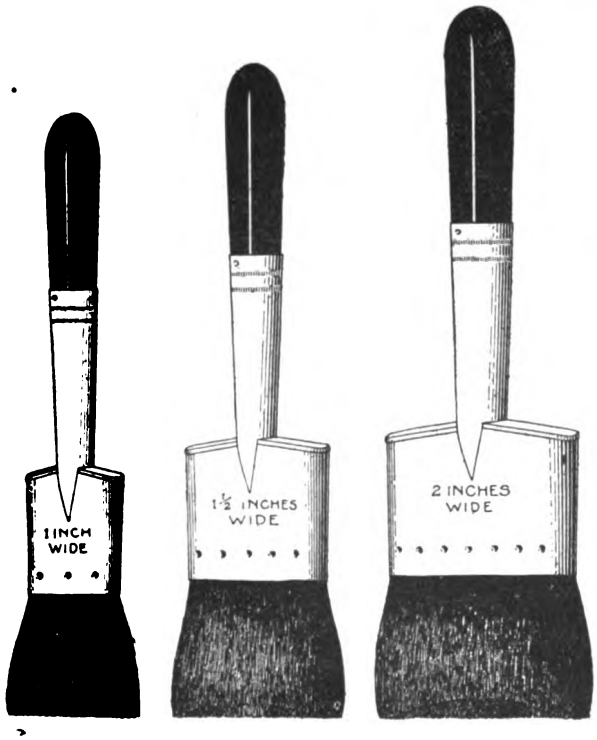
MODEL No. 18-F
For 1917-1918 Ford Cars
Made in two units, with black detachable casing. . . . . .
Price Each, $30.00

Catalog No. 6 Now Ready—Write for Trade Proposition!

SUPERIOR LAMP MFG. CO., 136 W. 52nd St., NEW YORK, U. S. A.

IMPORTANT POINTS ABOUT PAINT AND VARNISH BRUSHES

A Set of Three Brushes and the Automobile Dealer and Repairer for One Year for $2.00



Brushes Needed in Repainting and Varnishing an Automobile.

Did it ever occur to you that there was much difference between a good paint or varnish brush and a poor one? Probably not. To most people a brush is just a brush. Yet an analysis shows that there is an almost measureless difference between a good brush and poor one.

For instance, a properly made Flowing Fitch brush is hermetically sealed, so as to keep the paint, or whatever may be used, from getting into the brush at the top and loosening the hairs. All such properly made brushes are solidly set in glue cement inside a leak-proof ferrule, and a whole row of neatly clinched nails are driven in at the end of the ferrule to give added security, and a guarantee that the hairs will not pull out.

A Fitch brush is *smooth*, *soft*, and *flowing*, and does not "mush" up or get flabby like a cheap brush, but holds its springiness. The trouble with cheap brushes is that the ferrule is nothing more than a single band of tin, open at the top, with a couple of nails jabbed through. When you use such a brush the cheap hair will pull out and scatter all over your work, because it is not held in securely enough to stand the drag of the brush in painting or varnishing.

A brush may be washed with gasoline or kerosene oil, but to clean it thoroughly turpentine should be used. No brush used for painting should be used for varnishing.

We have recently made arrangements with one of the best manufacturers of these properly made brushes in New York to offer a set of Three in connection with a subscription to the AUTOMOBILE DEALER AND REPAIRER for a year for an even $2.00. These brushes sell at retail for $1.40. It will be seen, therefore, that there is a substantial advantage in sending to us for the AUTOMOBILE DEALER AND REPAIRER for a year, and for a set of these brushes.

Present subscribers can have their subscriptions extended for a year, and secure a set of brushes, on the same terms. These brushes are guaranteed in every respect, and though they cost more than cheap brushes would cost, they are far cheaper in the end, because of their lasting qualities and the good work that can be done with them. No man can afford to waste expensive paint and varnish on an automobile by using a cheap and poorly constructed brush, such as is usually to be found wherever brushes are sold. The ordinary dealer in brushes himself as a rule has very little knowledge of the quality of the brushes he sells.

Remit by check or money-order, and your name will be entered as a subscriber to the AUTOMOBILE DEALER AND REPAIRER for a year, and a set of these brushes, which are just the right size and shape (see illustration, which is exactly one-half the actual size of the brushes,) will be sent to you, postage prepaid.

Address all orders to the

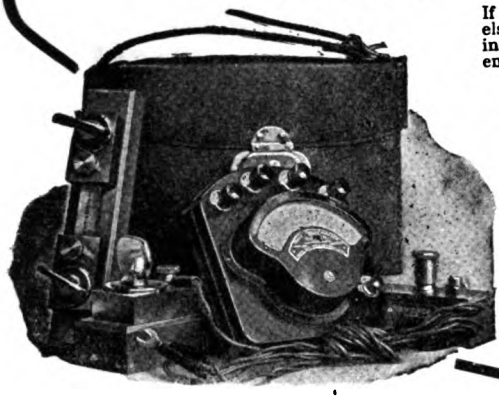
MOTOR VEHICLE PUBLISHING CO.

Publishers of the
AUTOMOBILE DEALER AND REPAIRER

71-73 MURRAY STREET, NEW YORK

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Electrical Repairs Bring the Big Profits!



If you cannot repair electric starting and lighting equipment intelligently, your customer will go elsewhere for this service. He will take the rest of his trade with him. There is more money in electrical repairs than in any other department of the garage business. The demand is enormously increasing.

Weston Model 280 **GARAGE TESTING INSTRUMENT**

is the best, the most reliable and therefore the cheapest electrical equipment for you. It enables you to determine promptly and accurately the condition of the electrical equipment of any automobile, just where the trouble is and just how to remedy it.

Write for our *Special Proposition.*

Weston Electrical Instrument Co., 2 Weston Ave., Newark, N. J.

23 Branch Offices in the Larger Cities.

PERFECT POWER FROM EACH PISTON



A ONE-PIECE PISTON RING

GILL PISTON RINGS are self fitting, ONE-Piece rings of sturdy construction. They have a distinctive joint which absolutely prevents the escape of compression, the formation of excessive carbon, or the pumping of oil into the combustion chamber.

ASK YOUR DEALER for GILL PISTON RINGS, or write us today.

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20th CENTURY'S No. 6 SELF-VULCANIZING PATCH



This new idea in Patch construction eliminates every possibility of an imperfect tube repair—and the man who looks at an idea to see if he can use it, and not to see if he can get along without it, is the man who wins out every time.

This Patch is Guaranteed Not to Loosen, Leak, Creep or Blow Out. Absolute Satisfaction or Money Refunded

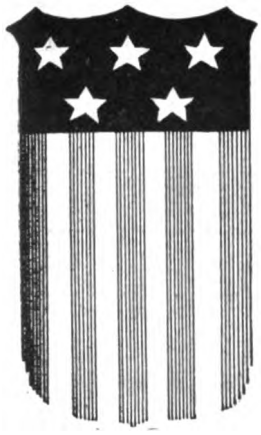
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Are Doing Their Bit

Enable Your Car to Meet War Time Requirements of Economy and Fuel Conservation.

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If your car is not equipped with a PECK'S Super Heat Manifold, order one today. It is guaranteed to give you from 40 to 60% more miles per gallon, with the same efficiency that could be obtained with high-test gasoline.

Cut fuel costs; increase mileage; eliminate carbon; give more flexibility, greater power; stop over-heat of motor; prevent fouled spark plugs; save trouble and satisfy owners.

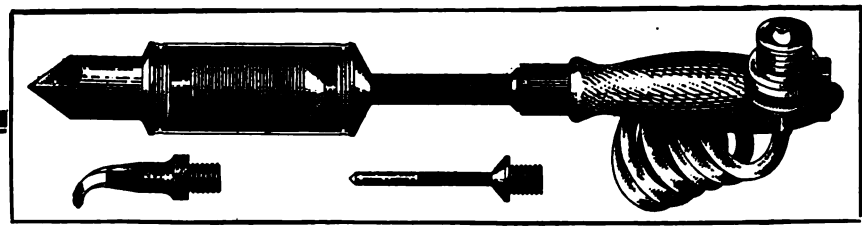
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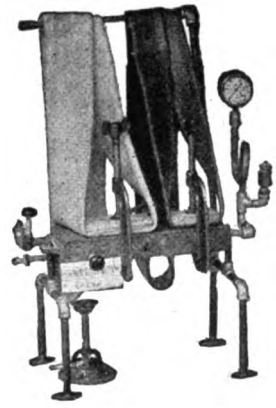
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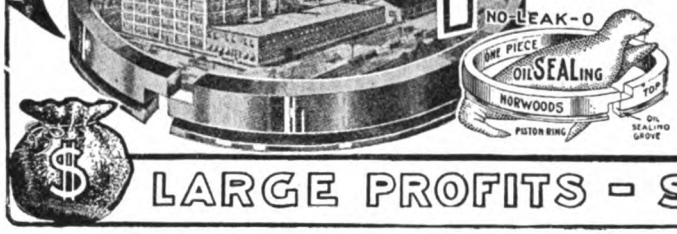
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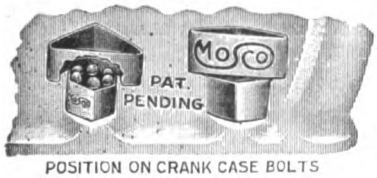
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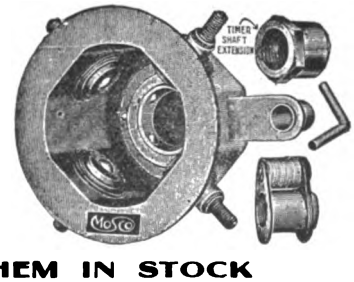
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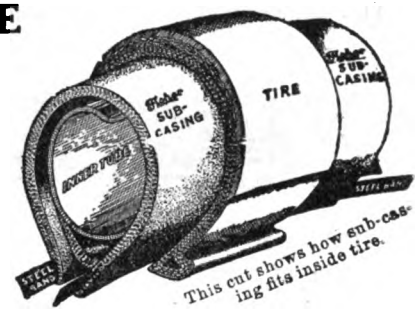
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These weakened places are hard to detect now, but will result in blow-outs later.

RIM-GRIP SUB-CASINGS reinforce the fabric of the tire at all points from bead to bead. They make a partially worn tire stronger than it ever was. It can be worn out completely and the sub-casing used in another tire. As the cost of equipping a car with new tires is much greater than last year, it will pay you to investigate Rim-Grip Sub-Casings. *Write for particulars.*

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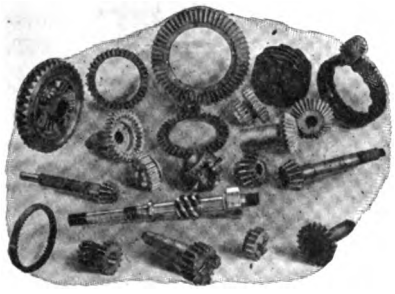
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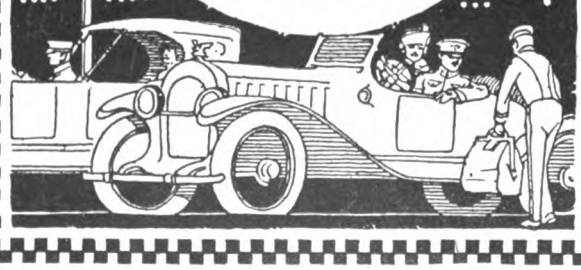
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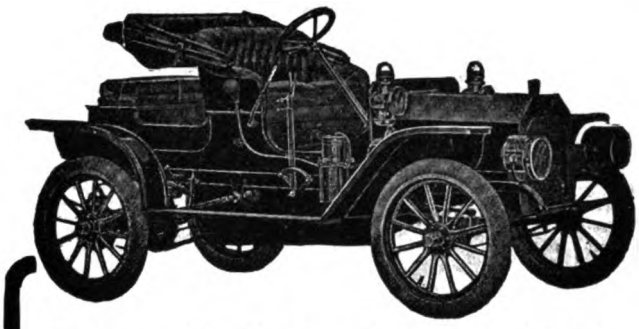
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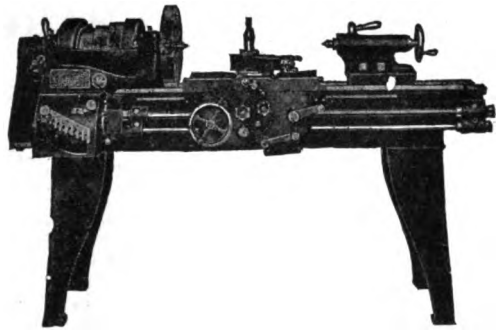
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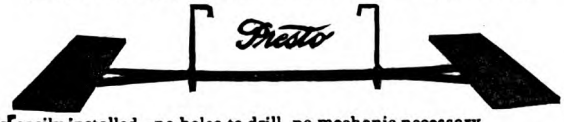
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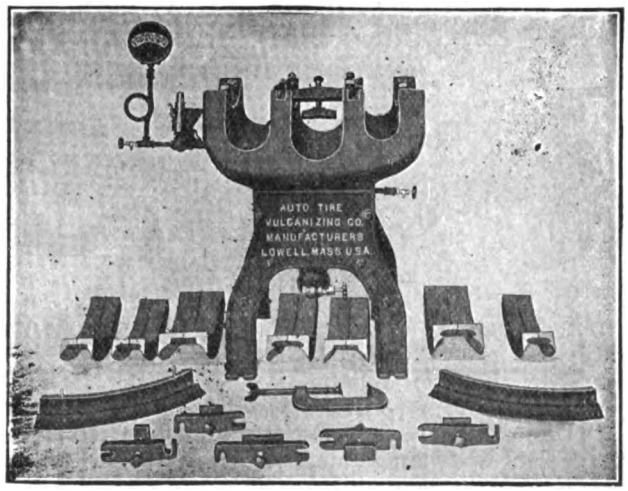
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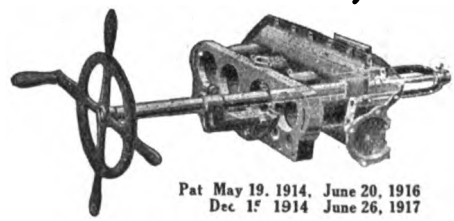
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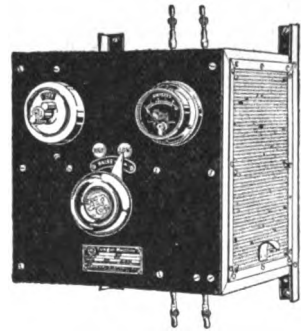
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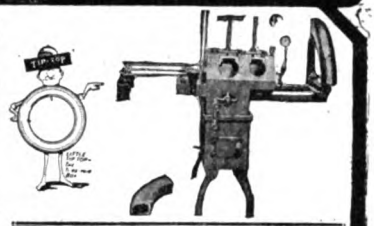
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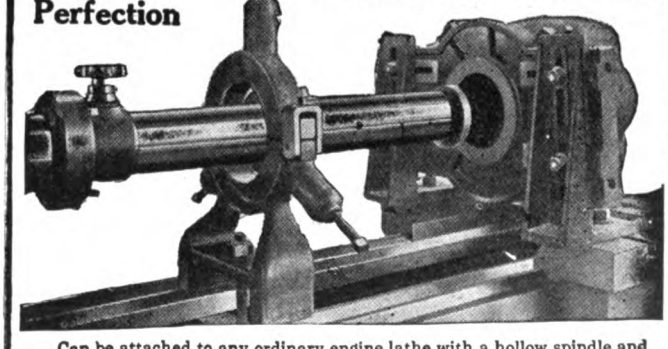
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E	2	1	12	8½
F	2¼	1¼	12	10
G	2½	1½	12	11½
H	2¾	1¾	12	12¾
I	3	2	12	13¾
J	3¼	2¼	12	15⅛
K	3½	2½	12	17
L	4	3	12	21
M	4¼	3¼	12	20

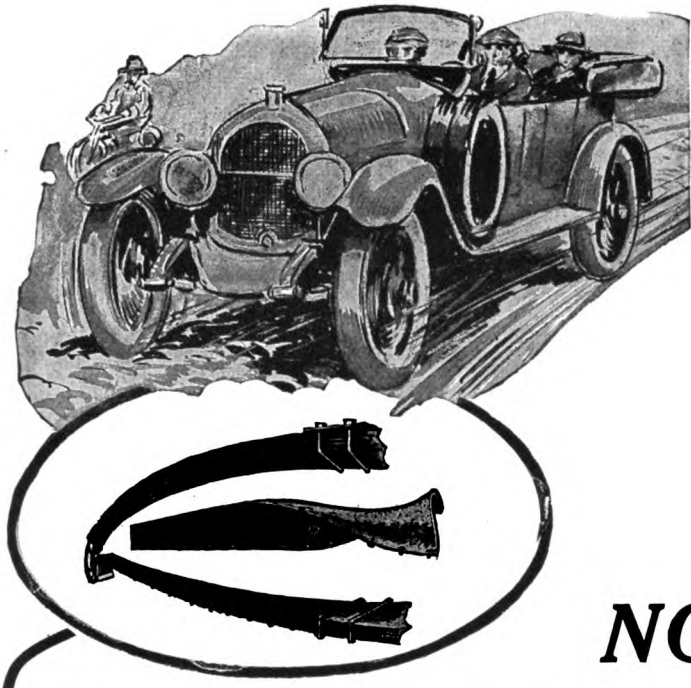
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The Car Ambulance and the Patients

The Second of the "Sick Car" Series, Dealing With the Service Truck and Other Important Equipment

IN the last issue of this magazine, I likened the automobile to a person, and compared the garage with a hospital. The idea is not entirely new, for I know of a garage where a sign was posted, "Office hours from 9 A. M. to 9 A. M.," and another where the slogan is "If your car is sick, call us; our phone never goes to sleep."

In the "wee sma' hours" a phone call comes on the line "car disabled, three miles south of Wineville on the Beeville pike." Perhaps if the phone doesn't go to sleep—it gets drowsy and the garageman loses the rest of the message. Like a doctor or a surgeon he doesn't have time to ask for details—he drops the phone and "hustles" for his ambulance and to the rescue.

Away out in the country there is a patient for him; a patient who may be suffering from a broken steering knuckle or a dislocated wheel. A sick car that has been starved nearly to death by lack of lubricant or has been burned badly by lack of water.

It would never do for the repairman to visit the "patient" prepared only to change a tire or scrape in a bearing; if the sick car were suffering from another "complaint." Like a doctor, the repairman must be prepared to meet every contingency; he must be prepared to feed the car with gasoline or to take it to his "hospital" in the ambulance. If the "patient" is able to walk or limp home the garageman must be prepared to give it the necessary assistance in the nature of a tow.

The Car Ambulance.

The service truck must be an ambulance in every sense of the word. In the "car ambulance" must be carried every possible repair tool, and room must be provided for certain supplies. The ambulance must be so arranged that it is a veritable "traveling garage," else it is almost worthless.

A garageman may build up a reputation upon his service and once his patrons feel that he can be depended upon for every emergency his mechanics may be pretty sure that they hold permanent jobs. I once lived in a small country town where there was one garage. The man in charge of this garage was an excellent mechanic—a man who had "lived with" the automobile since 1901 and who knew these machines from engine to differential.

This garageman did a thriving business and depended mainly upon transients and tourists for his trade. There was one big trouble with this man, however, he was very independent. He had work enough in his shop and seldom obliged autoists by road or service trips. If an unfortunate traveler was forced to leave his machine on the road—no prayers would influence the garageman to tow it in and "wished to be" customer had to "fall back" upon the lowly equus domesticus for motive power.

This sort of treatment began to work adversely for the garageman, and when a rival opened a garage in the same town, our first hero met his Waterloo and shortly thereafter closed his doors.

The rival repairman was dependable and tried to be just as obliging at two o'clock A. M. as at two o'clock P. M. At first, he too had to call upon the horse for towing, but unlike the first garageman, he furnished the horse. He did not expect the autoist to bring all of the work to his doors, but went out after it if necessary. This sort of treatment brought its reward and soon he gained a state-wide reputation for obligingness and ingenuity. He it was who hit upon the slogan of "Call me by phone at night or day—if you can't come here, I'll come your way," and it was this garageman that built the first "car ambulance" that I ever saw.

This ambulance was, and is, a marvel of ingenuity. With it about every sort of road work can be done. I

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have seen a car lifted from beneath a 40-foot embankment and I have seen the ambulance carry a 90 per cent wrecked Packard car to the "hospital."

The ambulance was large enough to accommodate a fully assembled car, and whether the machine stood on its "four feet" or was a total wreck it could be taken care of by the ambulance. I well remember the time when an "Elizabeth car" (often disrespectfully spoken of as a "tin lizzie") disputed the right of way with a freight engine at a grade crossing.

A Badly Injured Patient.

Elizabeth was badly injured, was, in fact, entirely broken up. She lay at the side of the road a total wreck, except for one wheel and the steering gear. An ordinary "Car Surgeon" would have thrown up his hands in despair at the suggestion of getting her to the hospital; yet our friend with his "Ambulance" loaded her into the machine in just 15 minutes after his arrival upon the scene.

This quick work was only made possible by the fact that the garageman had a suitable car ambulance. I will wager to say, that had Elizabeth fallen over a cliff, or anything short of a mountain, her remains could have been picked up and loaded into the ambulance in very short order, as this ambulance or service truck was such an excellent device. In this relation I will endeavor to give a complete description to cover the essential features. For want of a better name I will call the garageman Hagan, simply because this does not happen to be the name under which he is known. In order not to show any favoritism I will forget to mention the name of the truck, which Mr. Hagan purchased originally. As a matter of fact, any two-ton truck chassis may be used, provided the body is made as shown in our drawing.

How the Ambulance Was Constructed.

In the first place, the front driver's seat was moved as closely to the wheels and controls as possible, and the cab for the driver constructed of plain boards, having two panels and one window inserted.

The body proper begins just back of the driver's seat and is constructed upon cross members rather than lengthwise pieces, in all there were nine of these cross pieces. They should be made of two-inch thick oak planks and each fastened firmly to the chassis. Mortised into the lowest edge of these cross members are two lengthwise braces, which carry the last three cross braces, which cannot rest upon the frame.

The cross pieces are so arranged that their tops come above the truck tires, as shown in sketches D and E, Fig. 1, and upon them is constructed the frame as shown

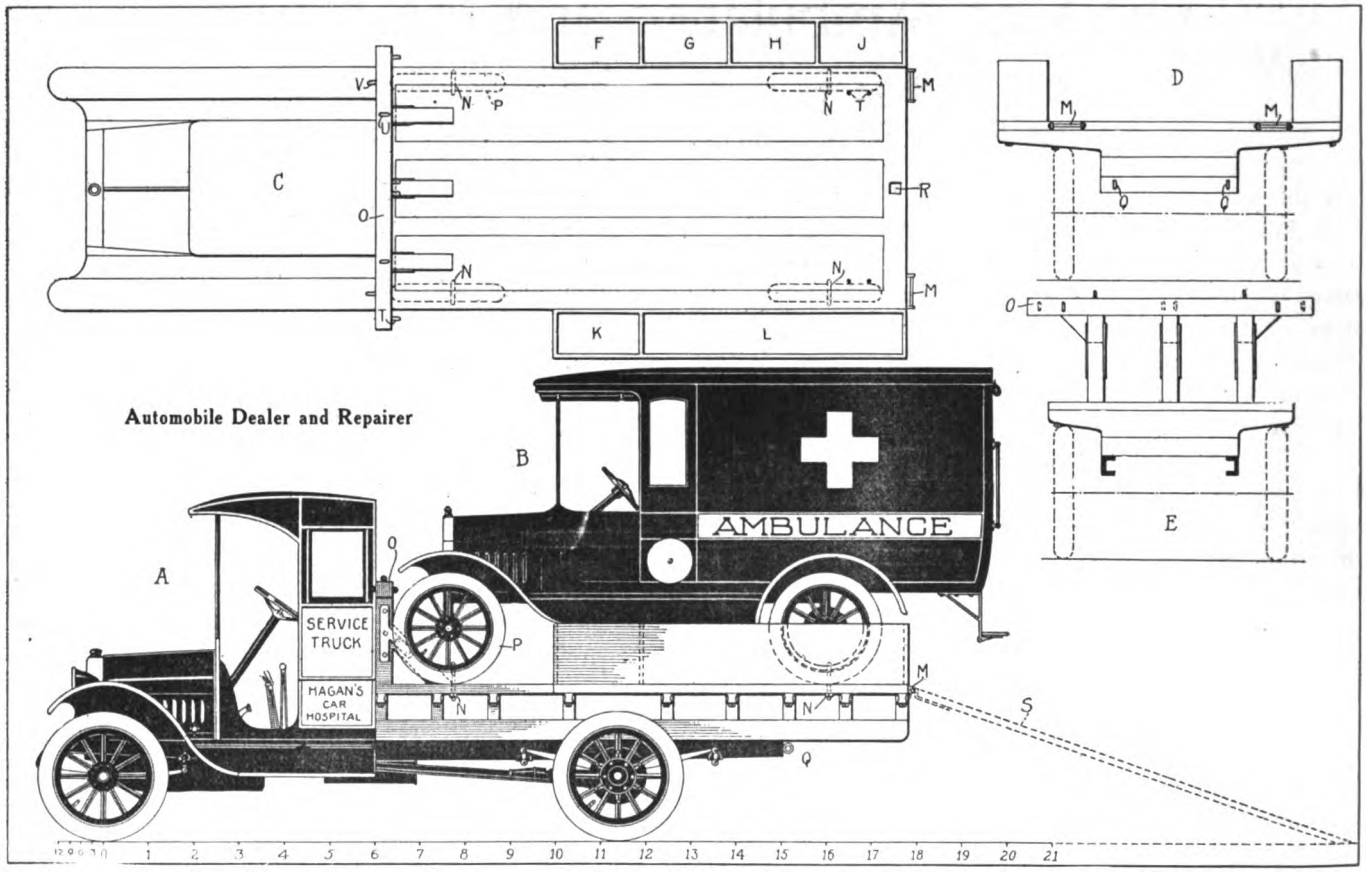


Fig. 1—Details of the "Car Ambulance" or Service Truck, Showing How a Ford Car Could Be Carried in the Body of the Machine.

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in C. The total width of the frame inside dimension is 62 inches. The two sills at the sides are wide enough to permit the carrying of a standard car, as shown at B.

In the same sketch one will notice that the side boards begin just in front of the fourth cross brace and extend to the back. These sides serve to support the sectional tool boxes, as shown in C, at F, G, H, J, K and L. The depth of these sections may be anywhere from 12 to 15

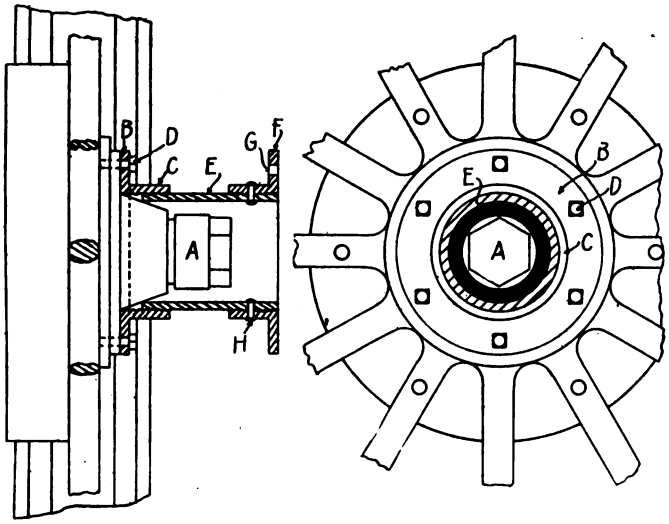


Fig. 2—Showing Details of the Drum Hoist.

inches, while the width need not be over one foot. In order to serve as a support for the tool boxes the widened body and the cross members beginning at the fourth from the front, are considerably wider, as shown at D, than are those nearer, and they are shown at E.

In reference to the sketch C, notice the hooks shown at N, which are shaped like the letter L, so arranged that they will fasten a car into place. At the rear of the body the arrangement is similar except that several holes, as shown at T, are provided for the hooks N. These different holes are arranged so that a longer wheel-based car may be locked into place. An important feature of the body is the front of the truck, a detail of which is shown at E in the various figures.

This dash board, if we may term it as such, is built of heavy oak timbers and re-enforced by three diagonal braces. At the top a 4 x 4 joist is fastened in place, fitted with a number of eye-bolts, as shown on T, U, V.

At the rear of the body there are two hinge fittings, shown at M, which consist of two braces with a bolt passed through them. Two long boards are provided, each with a hook at the end, so that they may be hooked over the members M, as shown at S, in diagram A, by the dotted lines. These boards serve as skids, up which to drag the "patient," and, when not in use, are carried in the body of the truck. A square hole R is cut in the rear body brace, to carry the derrick, of which we will speak later.

The Drum Hoist Feature.

The second feature of the device is shown in Figure 2, and consists of a miniature drum hoist, if we may be allowed to use this expression. In making this drum hoist, for each wheel, a heavy 3½ inch hydraulic pipe nipple is used; upon each end of it is fitted a floor flange. The whole device is firmly fastened to the wheel by the same bolts which fasten the wheel hub in place.

Referring to sketch, Figure 2, C indicates the flange, which is bolted to the wheel by the bolts D. Into this flange C is screwed the nipple E and upon the nipple is screwed the flange F; F should be riveted or welded to the nipple so that the nipple and the flange form one piece. Through the flange should be bored a hole G, large enough to admit the insertion of a rope or cable. The flange C remains upon the wheels at all times, while the rest of the fittings may be carried in the tool box, until used. The flanges on the left hand side of the car are fitted with right hand threads, while those on the right hand side of the car should be fitted with left hand threads.

The Portable Derrick.

The second important feature of the truck is shown in Fig. 3, and we will term it a portable derrick. At the left is shown the open derrick, from the side, in the middle the derrick is shown with the arm folded back, so that it may be carried in the tool box and at the right is shown the front view. The member A is made of oak and measures 4 inches square. Its height should be at least 36 inches. At the bottom is cut a small shoulder so that it may be fitted into the square hole at the back of the truck, shown at R in Fig. 1. The end of this projection has a square hole cut through it to permit the insertion of a wedge E.

The diagram at the left in Fig. 3 shows how the derrick looks when in place. N shows the cross section of the floor bolts of the truck. The standard of the derrick should be strongly re-enforced by two braces at the sides, B, held in place by the bolt D and a single brace at the back, C. The swinging arm is mounted upon a

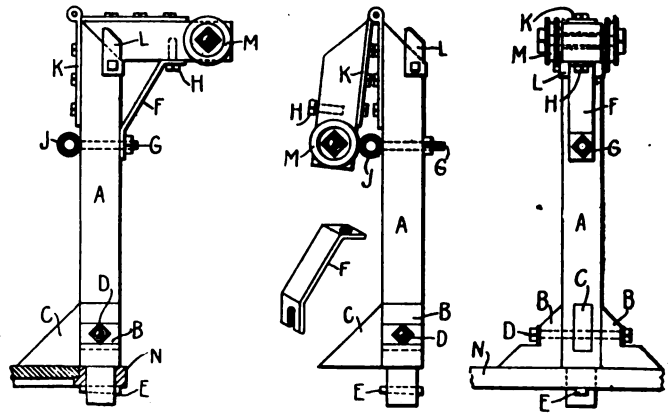


Fig. 3—The Portable Derrick and Its Construction.

large, heavy hinge, K, and held in place at each side by straight iron pieces, L. The eye bolt J, extends 1½ inches beyond the upright, while lagscrew H is screwed into the derrick arm.

A brace, F, of heavy iron is fitted with a hole at the top into which H fits and a slot at the bottom which fits over the eye bolt G. Two wheels, M, are provided upon

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each side of the cross arm and may be mounted upon a piece of hydraulic pipe, held in place by a long bolt. In order that we may understand thoroughly how these various fittings are utilized let us refer to Fig. 4, which

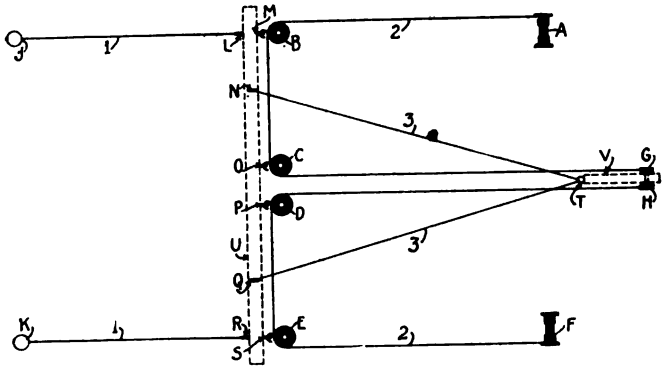


Fig. 4—Pulley Arrangement When Drum Hoist and Portable Derrick Are in Use.

gives a diagram of the rope fittings, eye bolts, and derrick. A and F represent the wheel hub or drum hoists, shown in Fig. 2, the derrick is shown in the center at V. The derrick pulleys at G and H and the cross member back of the driver's seat indicated by the dotted lines. In this case arrangements have been made to lift the car from beneath a straight drop. We will assume that the truck has been backed up a precipice as near as possible and that the back of the truck with the derrick extends over the precipice.

Lifting a Patient Bodily.

The two eye bolts V, shown in Fig. 1, are lettered L and R in Fig. 4, and are connected by length of cable to telegraph posts or pins driven in the ground ahead of the truck, as shown at J and K. These two cables serve as braces to prevent the truck from being carried over the precipice. Four blocks, B, C, D and E, are hooked into the eye bolts back in the driver's seat, while the derrick is fastened to the eye bolts N and Q by the two cables No. 3, fastened to the derrick at T. Cables No. 2 are each fastened to the wrecked car brought up through the derrick wheels G and H, through the blocks B, C, D and E, thence backwards to the wheel drums A and F.

The back of the truck is then jacked up from the ground and the engine started winding the cables, thus lifting the disabled car to the road level once more. As soon as the disabled car has been lifted high enough so that it can be fastened to the back of the truck, through the eye bolts shown at Q in Fig. 1 the truck wheels are put back upon the ground once more and the truck moved ahead.

No ambulance is complete unless it carries with it one or more "crutches." If a car is disabled and should happen to lose one of its wheels it may be just as helpless as a man who has lost one of his feet. If the man is given a crutch he can usually get along, while the same thing is true in the case of the wrecked automobile.

The Patient's Crutch.

The automobile crutch is illustrated in Fig. 5. The body, or main part of the motor crutch, B, is made up of three planks side by side, these planks are bored through at the bottom and fitted with roller bearings and sleeves, as shown at K. Most any sort of roller bearing will do, for it is not necessary to have a tight fit; most any second hand bearing will answer the purpose just as well as a new one. The heavy pipe or iron tube is slipped through the bearing and upon it are mounted the two iron wheels F. These iron wheels are held in place by nuts M and cotter pins O. The bearings are retained by a flange, J. As a towing bar a piece of strap iron, E, is used; this strap iron is given a half twist at H, and when in place, is fastened to the back of the motor ambulance, or sometimes to the car itself.

Three holes shown at G are fitted with bolts so that the length of E may be altered to fit the occasion. To fasten the crutch in place two U-shaped bolts, C, are placed on top of the device. In Fig. 5 is shown a cross section of the "patient's" axle, A. D shows the iron strap used in connection with the U-shaped bolts to hold the axle tightly in the crutch.

For a complete equipment two "crutches" should be carried together with plenty of strong rope or cable. The small ordinary repair tools are carried in the compartments F, G, H and J, shown in Fig. 1; the larger tools together with the "crutches" and portable derrick in the compartment L, while the compartment K is fitted with a gasoline tank large enough to take five gallons of fuel.

Of course there is no need for me to describe the regular equipment of small tools carried. There is one point which should be mentioned, however. Hagan never allowed anyone of his mechanics to "borrow" any of the tools from the ambulance, and he adhered to the rule himself. He realized that he owed his business to his reputation for quick service and he let nothing interfere

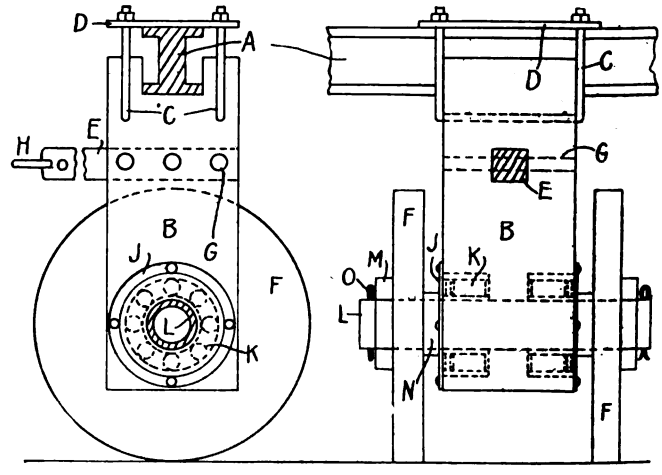


Fig. 5—Details of the Crutch.

with this reputation. A new helper or green mechanic might have taken a wrench or hammer from the ambulance once—but never twice. The penalty for breaking the rule was instant dismissal. Hagan paid his men a

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good salary, was fair and honest, and men liked to work for him.

Hagan was sympathetic with his customers and I think much of his reputation was due to the fact that he was so anxious to help and prescribe for his "patients." Like a surgeon or doctor he seemed to take pleasure in doing good and repairing wrecked cars.

Hagan always had a spirit of economy mixed with his sympathy and as a proof of it I will always remember the look of grief upon his face when he went to inspect the "remains" of a "departed" Hudson car. The driver made a practice of starting in second speed at all times and had formerly owned a Dodge.

Our readers will recall that the reverse gear position of a Dodge car is in the same location as the second speed position of the change gear lever of the Hudson. The driver had hurriedly changed his gears one day and backed the car over a ten foot wall. Luckily the driver escaped but the car was a total wreck.

It had landed upon its rear wheels and had turned completely over. I reached the scene about ten minutes after Hagan and found him, literally with tears in his eyes. "And to think," said he, "An hour ago that was a new machine, now it's nothing but junk." Hagan did his best, but the machine never regained its health again.

Does It Pay To Buy Seconds?

One Man's Opinion of Low Priced Tires and How He Manages To "Pick a Peach out of a Carload of Lemons"

BY F. L. PHILLIPS

I'M not much of a writer and I can't use that smooth, flowing language of "Bill" Shakespeare, but the editor says he doesn't care, just so long as I tell my little story so that the readers can get some "real dope" on tires.

I dropped into the office the other day to get a sample copy of the "best automobile magazine published" and to have the editor look over a letter which I wrote to a friend of mine. My friend wanted to know what I thought of factory-second tires, and I wanted to see if the editor knew anything about them that I didn't.

He read my letter through a couple of times then suggested that I write an open letter to all of you: here it is; everyone may not agree with me, but everything I say has been proven by quite a few years of automobile experience.

I began to repair automobiles, back in 1908, and it didn't take long to make a little money, for the machines in use at that time sure did need lots of repairing. I caught the "fever" and within two months I owned my first automobile—excuse me, I mean my first machine; and since then I haven't been without some sort of a "gasoline buggy."

Never have I bought a new automobile, they were all seconds, and never have I purchased a new tire—they have all been "seconds" too. I figure that I am quite a few hundreds of dollars ahead of the game, just because I am careful in buying the tires. My brother bought a factory-second tire, *just once,* then he shouted "Never again," together with other words that the editor says had better not go into the magazine.

A factory-second tire, in my opinion, sometimes gives as much actual service, in the long run as a new one, if you want to take the chance. Let me tell you how some seconds get onto the market.

If you will look over a new tire, you will find that the manufacturer's name and a serial number are vulcanized into the tire. The name is usually cut right into the tire mould but the number is separate. When the green tire is put into the mould, to be vulcanized, the workman puts a little metal tag into the mould also, and this tag bears the serial number. When the shoe is taken from the vulcanizer the tag sticks to it and is pulled off afterwards. Sometimes it sticks in the mould, however.

Suppose the workman happened to be thinking of his week's pay envelope, or the happenings of the day before or the world's series and forgets to take out the little metal tag. He looks into the mould and forgets that the tag belonged to the tire that was just vulcanized, and leaves it. Then the next tire also bears the same serial number.

The manufacturer don't like to put out two tires with the same serial number, so that, if they notice the mistake, they throw one of the tires to one side and it goes into the junk heap to be sold at cost price. It is a factory-second.

Rubber is funny stuff, sometimes it runs like molasses, sometimes it won't run at all in places, and the manufacturer's name plate doesn't fill up. Unless all of the letters are clear and plain, such a tire goes into the "second" pile.

In a big factory, the inspectors are pretty strict, they don't intend to put poor tires upon the market and if there are any little flaws in the rubber, if the tread is broken or imperfect, if the fabric seems weak in places, or if the rubber has been overvulcanized the tire is thrown to one side.

Before they sell these seconds, they buff-off the names and numbers and of course they won't guarantee them for any mileage. They send them to a jobbing house that deals in this kind of tires. One jobbing house may have a great many different kinds and makes, all of

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which cost them only the manufacturer's cost price and freight, so they can sell them way below the price of new tires.

There are about half a million different reasons besides this, that cause a new tire to get into the scrap heap, and it's the customer's business, when he is buying a "second" tire, to find the reason.

If you have decided to follow my advice and try a second, go about it like they do a trial in France. Assume that the tire is no good until you have proven that it contains no real flaws. Don't pay half price and expect a perfect tire and find out afterwards that it was really worth half what you paid. Don't expect the jobber to look the tire all over for you, do it for yourself.

You don't have to know very much, a tire is only a tire (sarcasm), it has only a lining and a tread. You just have to examine the fabric and the beads, and the side walls, and the tread, and the rubber and the color; that's all (more sarcasm). When you get a chance, go into a tire store and ask to see the cross section of a tire, then you will realize that a tire isn't just a tire—it is a "mechanical work of art."

If you intend to spend twelve or more dollars on a tire, spend as many minutes on the examination. First take the tire to a window where there is good light, then stick your head through it as though you were putting on a horse collar. Spread the beads apart and examine the inside of the shoe. Go over every square inch of the inside and see that the fabric is not broken at any point. Work the fabric back and forth with your fingers to be sure that the break or tear isn't filled up with whiting or filling.

Now start all over again and examine the side walls, outside and in. See that the rubber is not torn or the fabric cut with a trimming knife. Sometimes the workmen, in trimming off the ragged edges, cut through the rubber with the knife. Don't buy a tire that has poor side walls or that has the fabric showing on the outside, unless you want to spend your time on roadside repairs. I always spend my time on the examination and seldom bother on the road. If the tire is worn out, I usually know it beforehand and if I am in a hurry I take the tire off in the shop.

Start all over again for the third time and go over every inch of the bead. Make certain that the fabric passes from the inside over the bead and is not cut away from the bead at any point. You can only tell this by the feeling because the fabric is covered on the bead by a thin strip of rubber.

Now you can take your nose and head out of the tire and start upon the outside. First, feel of the rubber and see that it is soft and springy. If it feels like a rubber heel or the bit on your pipe-stem, ask the dealer for another, he'll sell the one you examined to someone that hasn't read this story.

Live rubber feels just like the heel on your foot. It is firm, medium-soft and springy. It is the kind of rubber that you want in tires. Don't take a tire that looks as though it had been painted with white paint, it is dead and the "deader" it is the quicker it will wear out. If you should leave a tire in the sun for a short time the rubber would be just like chalk. Don't accept a tire that has been in the dealer's window, unless he will guarantee it or give it to you for a birthday present.

After you have examined the outside rubber and are sure that it is not cut or broken, work the tire between your fingers, all the way around and try to locate any places where the fabric has separated from the tread. This seldom occurs in a new tire, and if it does occur you cannot always locate it. It is one of the chances you take in buying a second; and if you have followed my directions, it is practically the only chance you take.

If you are not sure of locating all of these troubles—buy a new guaranteed tire; it is safest, that's just what I told my brother because I know that he wouldn't go to the bother of examining a tire before he bought it.

Now I don't want anyone to misunderstand this article and think that I recommend second tires in every case, for I don't. If anyone has the money they should always buy new tires—if they have plenty of time and lack the money, then they should follow my directions and "take a chance" at the seconds.

I own an old car that cost me just a little over $100. It don't appear to be much, but I have often towed home some "real" cars with it. I can't bring myself to invest in a set of tires that cost more than the car did—that's another reason why I buy "seconds."

They say that in the Armour packing house all of the pig is used except the squeal. Well, to make a comparison, I always try to use not only the whole animal, but the squeal as well.

VETERAN INVENTOR KILLED.

Well Known Automobile Manufacturer Is Killed By the Car Which He Invented.

IT IS with great regret that we write of the death of Mr. Francis E. Stanley, the inventor of the steam car which bears his name. Mr. Stanley was killed on July 31 by the overturning of his car on the Newburyport turnpike.

Mr. Stanley was born in Kingfield, Maine, on June 1, 1849, and early in life evinced a tendency toward mechanics. He worked as a carriage maker, then as a photographer, and in connection with this latter occupation produced and manufactured the well-known Stanley Dry Plate.

Mr. Stanley's mechanical ability, combined with intensive study of engines, led him to work upon a small steam engine suitable for installation in a carriage, and early in the twentieth century he produced a practical steam "carriage" which he placed upon the market.

By perseverance and concentration the steam machine was improved with the passing years until it stands today a fitting monument for a great inventor.

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Starving the Goose That Lays the Golden Eggs

When a Manufacturer Ceases to Advertise; He Might Just As Well Begin To Cut Down On Production, For His Customers Have Short Memories

BY FRANK FARRINGTON
Illustrated by JATT

THE mourner's bench, in manufacturing circles, is always filled with men who are regretting that they ceased advertising before they got their market fully developed or that they ceased advertising after they thought they had it developed sufficiently. In either case it is to weep over the cessation of publicity. If these manufacturers do not kill the goose that lays the golden eggs they at least stop feeding her.



The Mourner's Bench—Is Filled With Men Who Regret That They Ceased To Advertise.

Of course the example of this most familiar to us is that of the bicycle business. After most of the large manufacturers had combined, they reasoned that they might just as well save the big advertising expense they had been carrying because they had practically eliminated competition. Everybody who bought a bicycle would have to buy from them, anyway, and they thought that everybody was sold on the idea of riding a bicycle.

Well, they doubtless did well to eliminate some of the advertising expenses. It was costing one manufacturer as high as twenty dollars per machine on his output for just that phase of his publicity which took care of the racing end. But when they cut out all advertising, they simply took the shortest method of putting the "kibosh" on the whole business, and bicycles became "dead wood" and remained so for several years, as far as pleasure riding was concerned. Today advertising is bringing them back into favor, and 1917 saw 600,000 of them sold.



Haven't You Heard Small Boys Discussing Cars?

The automobile manufacturers figure that they have learned an important lesson from the bicycle industry. But have the accessory people learned their lesson, too? Automobile advertising is going to be kept up through war or peace, whether the output is oversold or undersold. Are the accessory people, once they get a market, going to reason that their market will endure indefinitely?

It is only twenty years ago that most bicycle riders thought of the name Lobdell in thinking of wood rims for wheels, and wood rims had just displaced steel rims. The old Lobdell factory, in Marietta, Ohio, has, to the best of my knowledge, been empty and idle most of the time for fifteen years now. I don't know where the wood rims come from, but I know that nobody's name stands for what Lobdell did stand for among riders.

Speaking of rims, it was not so long ago that we were familiar with advertising of rims in the automobile magazines. Since that advertising first began to appear, demountable rims have become so generally used that most manufacturers make them a part of standard equipment, but what kind are they using, and why? At first manufacturers evidently hoped to induce the motoring public to specify their rims in buying a car. Now, evidently, they are satisfied to take their chances of getting their share of the business from the manufacturers. I have demountable rims on a car I've driven 7,000 miles, and I don't know today what make of rims they are. In fact, there is no name on them, and I have asked the agent from whom I bought the car to find out the price of another extra rim, and he has thus far failed to do so because he doesn't know



I Know the Boys Study Those Things.

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what kind of a rim it is. Exceptional instance? Maybe, but actual just the same.

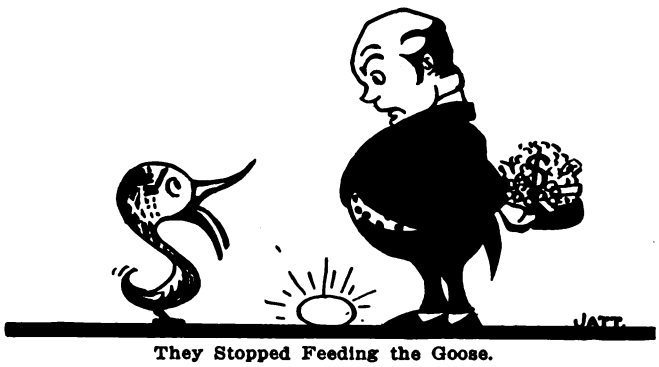
Just two demountable rims names remain in my mind. One is a name I will not mention, because while I did not find the name on the rims, still the trouble I have had with those rims has compelled me to listen while several garage mechanics have exclaimed with greater or less force, "Those blankety blank ——— rims never were any good, anyway!" The other name that sticks in my mind is included in the phrase "Firestone tires and rims," which has evidently been impressed upon me by repeated advertising in the past.

Displaced by Other Products.

Two things occur to me in connection with this rim matter. One is that any manufacturer of rims who is satisfied with his rim sales today may tomorrow find that a cheaper rim has displaced his with many of his automobile manufacturer customers, and nothing can be done about it because the public neither knows nor apparently cares whose rims are on the cars. The other thing is that an advertising rim manufacturer might give the user many valuable tips on how to use his rims, how to put them on and take them off without damaging them and losing temper and epidermis.

More than this, there are many car owners who would carry two extra demountable rims, two spares mounted, if they were advertised into it; if they were educated to the advantage of having two inflated spares. Here is a big market for extra rims awaiting development and nobody after it. This opportunity is a dealer opportunity, too. There is a chance for somebody to dominate the demountable rim market.

With the arrival of the time when many accessories that were formerly bought and added by the car owner



They Stopped Feeding the Goose.

are made standard equipment on cars, the choice or preference in such accessories has passed in some degree from the buyer to the manufacturer. Perhaps it is this that has led many accessory and parts people to cease impressing their identity upon the ultimate buyer. But there are other manufacturers who are taking no chances of becoming simply nameless parts of the background.

What would Hyatt and Timken and Prest-o-Lite and Willard say to the suggestion that they discontinue advertising to the public and depend solely upon advertising to the manufacturer? They would talk to you about prestige, about the reputation they have built up for their products, and remind you that the constantly appearing new crop of automobile owners and prospective owners must be taught just what the older owners have been taught, that such names as those mentioned, and others I might mention with equal justice, stand for quality and service. They would tell you that for them to stop advertising would mean that in a few years nobody would care whether the new car was fitted with their products or with some nameless and reputationless product made to match the price the manufacturer wanted to pay in order to produce a car at a given cost.

Pride Based on Reputation.

A good deal of the pride one feels in a car is based on the reputation of the maker and on the reputation of the parts and accessories used. If you owned a car made of parts, none of which bore a manufacturer's name, and fitted with accessories of the same sort, would you brag about it? Wouldn't you be apologetic? And if the car itself bore no name—well, the only way you would become possessed of such a car would be by receiving it as a gift, and once you had it, it would stay with you because you never could sell it at any price.

We want reputation in what we buy. Of course that reputation must be based on actual merit, but that merit must be given publicity or it counts for nothing. We want to be able to brag about our car in terms that will be understood by people who have no cars and who know comparatively little about automobiles.

The man who buys a car for the first time must depend upon reputation. He may say he goes by what the automobile salesman tells him, but he judges what that salesman tells him by a reputation. The salesman, in recommending his car to a non-driver must fall back on reputation. If he boasts that his car is equipped with a Bosch magneto, how will that be any recommendation to the prospective buyer if Bosch magnetos are an unknown quantity to him, as they must be if they do not receive advertising? The appeal that is going to get over with the green buyer is that based on something that buyer knows about, or thinks he knows about. That is where advertising of parts and accessories counts even when directed toward a public composed to some extent of non-users.

Keep the Public Sold.

Everybody is a potential automobile prospect or has influence with such a person. Haven't you heard two small boys discussing cars and saying, "Gee, if I was gettin' a car, I'd have Hartford shock absorbers on it. They're the best." When you hear such a conversation about any accessory, you know that advertising has done its work there. The boy really knows nothing about shock absorbers or whatever it is he discusses. He has been impressed by the advertising. And if Hartford continues keeping shock absorbers at the front until that boy becomes a buyer, he is sold on them.

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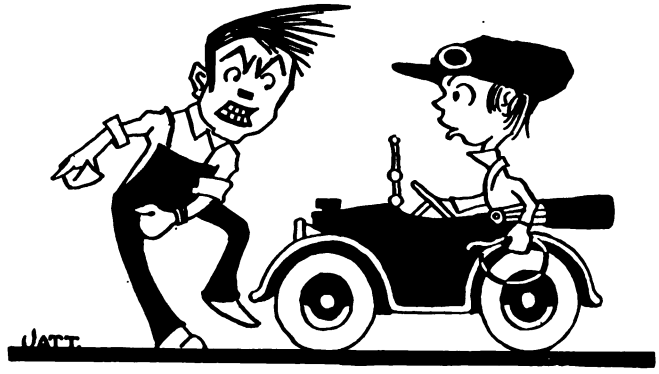
Not only must people be kept sold on these things after once they have admitted to themselves certain superiorities, but the public must be sold on parts and accessories, on reputations, in advance of the day when it can be sold in actuality. If I were advertising automobile accessories, I would, provided I expected to stay in the business indefinitely, begin by going into the juvenile publications and getting the boys on my side. I know the boys study those things and they influence their parents, and of course the boys grow up with ideas absorbed when they are young. There is a big interest nowadays in mechanical things among the boys. I saw a new public library opened the other day and the first patron was a boy of ten who wanted a book on electricity, and a large proportion of the first day's visitors were boys like that, looking for just such books.

I have been talking mostly about advertising to the ultimate buyer. It is just as important to keep the dealer sold as to keep the consumer sold. Unfortunately the automobile business is so young that we cannot draw contrasts between two periods ten years apart. Conditions have changed too much in a decade. But go into a garage to-day and note the names you see on tires, tubes, accessories, etc. How many of those names were there five years ago?

Of course the change shows the rapid growth of the industry, but it also shows that many standard articles of five years ago, popular then, have been relegated to the rear or thrown out of stock simply because the manufacturers have become self-satisfied with a prosperous business and a big demand and have stopped advertising, while newer manufacturers in competing lines have been generous in their use of publicity and have secured the trade. Many a manufacturer, keeping his product right up to date, equal in quality and improvements to any, has seen other lines, no better, get the call because of their advertising and his silence.

Do you suppose the Delco people would be where they are to-day if their heads had not brought to the business with them the National Cash Register faith in persistent publicity as well as the N. C. R. selling experience? If they have displaced the magneto ignition in many cases, hasn't it been partially due to their continued publicity, which has popularized Delco with the car owner while magnetos have not been advertised? "Printer's Ink" stated recently that the reason for the decline in magneto equipment on passenger cars is due to the magneto people discontinuing advertising. This may be putting it too strongly, since the increase in use of magnetos on commercial cars, tractors and aeroplanes has kept the demand up to the supply and even above it, still the time may come when magneto manufacturers will be back again after the automobile market they used to have. They will find it more expensive to win back the public than it would have been to hold it.

Practically every manufacturer has his experiences with users of his product who get unsatisfactory results. These dissatisfied buyers condemn his goods and injure their sale to others. The manufacturer who does not advertise suffers most along this line. He who does advertise has his opportunity to win back that dissatisfied customer. I have in mind a driver who equipped his car with a make of non-skid tires that proved unsatisfactory. He had seen them well recommended, and he knew others who had secured good mileage from those tires. But in his case they proved a poor investment, and



Those Blankety —— Rims Were Never Any Good.

he proceeded to knock them at every opportunity. But he kept seeing the advertising of those tires. He continued to note the manufacturer's claims of superiority until he began to wonder if there hadn't been something exceptional about their failure in his case. He made some figures on the weight of his car and load and the size of the tires. He decided he had been under-tired and had received as good mileage as he had a right to expect. In the end he tried the same tires again in a larger size and met with satisfaction and now he swears by those tires as hard as he formerly swore at them. It was advertising that did the trick.

I have known dealers to get the idea that they did not like a certain line, that there were other lines better, and they change over to the other lines and find the change has not been of any real advantage. Then, if they keep seeing the advertising of the first line, there is a pretty good chance of their changing back again. If they see no advertising of the old line it is a safe bet that they will not change back.

Everything points to the need for continued advertising if dealers or users are to stay sold, are to continue to buy and use a product, or to continue of a mind to buy it when they get ready to buy. The manufacturer who keeps up his advertising will not have to spend any time regretting what might have been.

Are you striving to become more efficient, or can the boys who have just learned the business give you no end of tips? Don't be satisfied to become a "has been."

Which habit are you "afflicted with" which lessens your efficiency and makes you fall short of your best? Are you master of yourself, or are you a slave to the habit? How much is it costing you per year?

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The Modern Starting Motor

How the Starting Motor Is Wound and Constructed and What Happens When the Starting Switch Is Turned On and Off

BY A. P. PALMER, E. E.

STARTING motors may be considered under two headings. First, where the motor is used simply for starting purposes, and secondly, where a motor and generator are combined in one unit, the generator being used for lighting and ignition. We will consider the one function motor first.

The starting motor is similar in construction to the generator or dynamo, having an armature, commutator, a set of brushes, field magnets and field coils. As more power is required of a starting motor than of a generator, the motor is made larger and heavier. Heavy wiring is also required, as a heavy current is used in starting and a small wire might be burnt out.

The motor is the reverse of the generator in action, as electrical energy is supplied to it, it transforms the current into mechanical energy which is used in starting the gasoline engine. As much as 25% of this energy may be lost in the transformation on a small electric motor. A ¼ H. P. motor, for instance, is only about 60% efficient, while a six H. P. motor is nearly 86% efficient.

High Torque in Starting.

In cranking or starting a gasoline engine, a very high torque must be developed to overcome the inertia of the load and the latter takes the form of intermittent rather than of steady resistance to the driving effort, owing to the alternate compression and expansion in the engine cylinders.

For this kind of work, which is similar to starting elevators and trolley cars, the series motor is found to be the best. In this motor the current passes through the armature and fields in series as through one circuit. The magnetic strength of the fields becomes greater with increase of the starting current and so builds up the torque of the motor. Suppose the magnetization of the field is such that an increase in current flowing in the series field winding will increase the field strength proportionately. If the current be doubled, the motor will exert four times the pull, while the speed will be less than one-half the former amount.

The current used in a starting motor varies anywhere from 50 to 200 amperes, depending on the conditions where a 6 volt system is employed. With higher voltages, the amperage is reduced, as the watts are equal to the volts multiplied by the amperes.

The horsepower required in starting varies from one-quarter to two, depending on the size of the engine and its design. Inasmuch as considerable load is placed on the battery in starting, care should be taken not to keep the switch on for more than a few seconds.

It may take a quarter of an hour running the engine to recharge the battery if the starter is used for thirty seconds. The result of improper use of the starter is a discharged battery, and this condition is exceedingly harmful.

Motor Drive.

In turning over the engine, the motor is connected by means of a spur, bevel or worm gear or by means of a chain.

Where a separate unit starting motor is used, the gear ratio may be such that the starting motor runs from five to twenty-five times as fast as the engine crankshaft is revolved during the cranking operation.

Combined motor-dynamos have lower ratios and in fact in some cases may operate at engine speed. A very common ratio for motor dynamos is between two and one-half to one and three to one.

An end view and section of the self-starter and Bendix drive are shown in Fig. 1. This self-starter attachment is automatic in its action and may be described briefly as follows:

It consists of a hollow shaft having screw threads on the outside and a hollow gear having screw threads on the inside, so that the gear screws on the shaft like a nut on a bolt. A circular weight is fastened to the gear and is slightly out of balance. A spring coil connects the electric motor shaft and the hollow screw shaft.

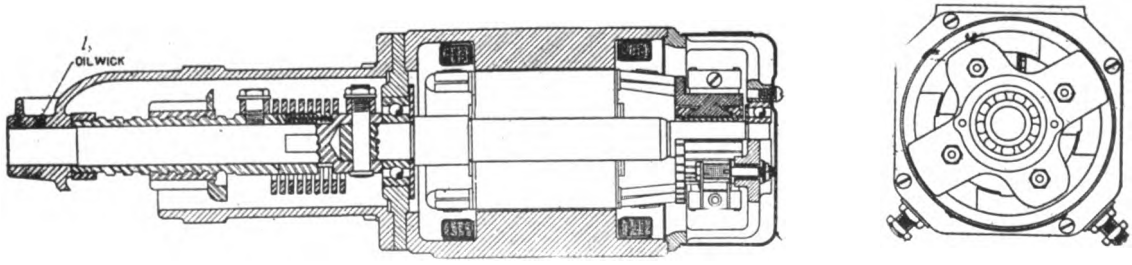


Fig. 1—A Cross Sectional and End View of Starting Motor With Bendix Drive.

When the starter switch button is pushed down, it brings the electric motor in action, which drives through the spring and turns the screw shaft. On account of the unbalanced feature of the junior gear it does not turn with the screw shaft; therefore, it moves along the

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screw shaft until its teeth engage with the teeth on the flywheel gear.

The resistance of the flywheel gear then causes the screw gear to be moved still further until it reaches the stop at the end of the screw shaft. The two gears are then meshed and the screw gear, having reached the stop, must now revolve with the screw shaft. At this particular moment the screw shaft and the electric

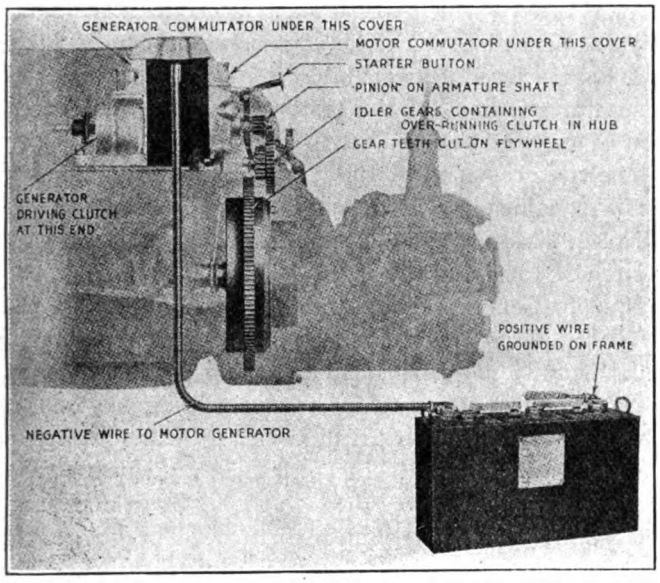


Fig. 2—Phantom View of Single Wire, Single Unit Motor-Generator.

motor are revolving at a high rate of speed and the resulting shock therefrom is absorbed by the coil spring which drives the screw shaft for that purpose.

Action When Engine Starts.

As soon as the engine explodes and runs under its own power, the flywheel turns much faster than it was cranked by the starter, and increases the speed of the screw gear over that of the screw shaft, thereby causing it to screw back out of mesh and into its original position, which position it retains on account of the automatic clutching function performed by the centrifugal force of the unbalanced weight, before mentioned, and a part of the screw gear.

When the electric motor stops running the screw gear has been fully moved away from the flywheel, and it remains in that retarded position until it is again required to start the engine. The screw shaft should never be oiled or lubricated, as it works to the best advantage when dry.

Another make of car uses the following system: When the starting button is depressed the current flows through two switches which permit the current to flow to the starting motor magnetic switch. In the magnetic pinion shaft is a powerful electromagnet having a series or pull in coil. Around the field poles of the starting motor is a short circuited winding. The pull in coil becomes energized and pulls a soft iron core into the magnet winding; the short circuit coil of the field poles prevents the starting motor from turning rapidly, as the first rush of current passes through the motor. It acts somewhat like a magnetic brake for a very short period of time.

The current which flows through the magnetic shift also flows through the starting motor, with the result that the starting motor turns slowly as it shifts the gear into mesh and then rapidly picks up speed and cranks the engine. Now, as the engine commences to fire, the current used by the starting motor falls rapidly and consequently the magnetic shift loses its excitation and a disengaging spring overcomes its pull and pushes the gear out of mesh.

In order to make the meshing positive, the teeth on the starting motor pinion and on the flywheel are cut at an angle. The effect of this is that when the starting motor drives the engine, there is a tendency for the gear to be drawn into mesh. When the engine commences to fire and tries to drive the starting motor the effect is to help push the gear out of mesh. This makes the motor fully automatic and practically foolproof. As the motor has ball bearings and there are no gears in mesh after the engine is started, its operation is practically noiseless.

When the engine commences to fire and speed up, the voltage of the generator builds up and the cut-out switch closes, grounding the positive side of the

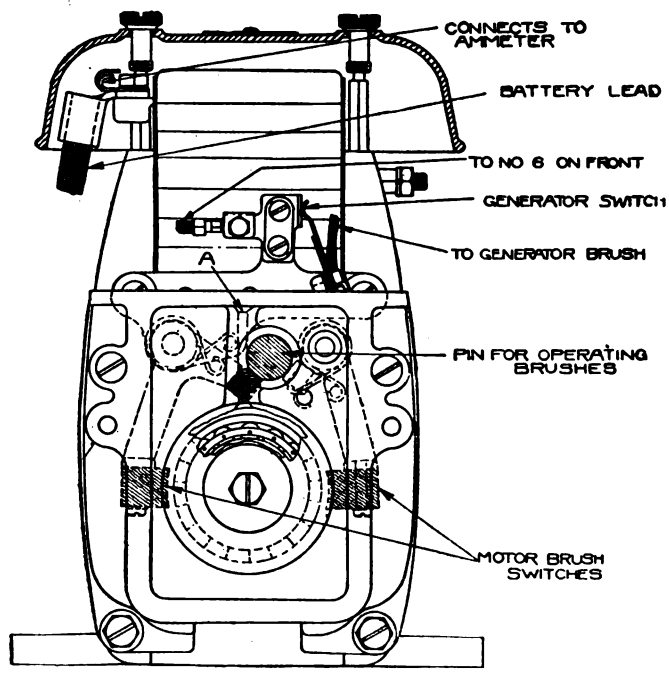


Fig. 3—Motor End of Motor-Generator.

generator. The instant this occurs, the wires on the generator, being grounded on both ends, cease to carry current to the primary relay switch magnet which allows the switch to open. This opens the circuit and allows the starting motor to come to rest. With this system no harm can result from leaving one's foot on the starting button when the engine speeds up, and no harm can result from depressing starting button when engine is

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running, unless car should be throttled down below eight miles an hour.

Motor is Series Wound.

The starting motor is series wound and develops about .7 horse power at 5.25 volts. It turns the engine over at about 125 revolutions per minute, which is fast enough to start on the magneto.

The following system is the use of a motor generator and does not employ a separate starting motor or a magneto. This is called the single wire, single unit system. Figs. 2 and 3.

One side of the motor generator, storage battery lamps, horn and ignition apparatus is connected to some part of the frame of the car or the engine. The other connections are made with copper wires or cables.

The motor generator serves both as a generator of current and as an electric motor for cranking the engine when starting. The principal elements of the motor generator are an armature and a field. There are two windings on the armature and two in the field—one on the armature and one on the field are used when the motor generator is used as a generator and the other windings when it is used as a motor.

Action of Motor Generator.

The motor generator, when acting as a motor, has the sole function of cranking the engine. In starting the first thing the operator does is to push down the ignition lever on the combination switch. This closes the ignition circuit and the circuit between the storage battery and the generator windings on the motor generator, causing the armature to revolve slowly.

A ratchet clutch in the front end of the generator allows the armature to rotate ahead of the driving shaft. The clicking noise that is heard when the ignition switch is turned on comes from this clutch.

Next the operator pushes down the starter button. The first movement causes the starter gears to mesh with the teeth on the flywheel. The probability of the ends of the teeth striking and failing to mesh is overcome by the slow rotation of the armature which began as soon as the ignition was turned on.

As the starter button is pushed further down the current between the storage battery and the generator windings of the motor generator is broken. Upon the last movement of the starter button the circuit is closed between the storage battery and the motor windings on the motor generator, causing it to act as a powerful electric motor which cranks the engine rapidly.

As the gear ratio between the armature shaft and the crankshaft is approximately 25 to 1, the armature would be driven at an excessively high rate of speed after starting the engine and before the operator let the starter button back if it were not for an over-running clutch in the hub of the idler gears between the flywheel and the armature shaft. The electric motor cranks the engine through this clutch, but after the engine has started and begins to run faster than the electric motor, the clutch slips.

When the starter button is let up, as soon as the engine is running under its own power, the first movement of the button breaks the circuit between the electric motor and the storage battery, a further movement causes the starter gears to slide out of mesh and the final movement completes the circuit between the generator and the storage battery which was broken when the starter button was pushed down. The engine running and the circuit being closed between the storage battery and the generator windings of the motor generator, the generation of current begins.

The motor generator has three distinct functions to perform, which are as follows:

No. 1. Motoring the Generator.
No. 2. Cranking the Engine.
No. 3. Generating Electrical Energy.

The cranking operation takes place when the starting pedal is fully depressed. The starting pedal brings the motor clutch gears into mesh and withdraws the pin which allows the motor brush switch to make contact on the motor commutator. Instantly a heavy current from the storage battery flows through the series field winding and the motor winding on the armature. This rotates the armature and performs the cranking operation. The main cranking current is not conducted through the ammeter as this is a very heavy current and the ammeter on the dashboard must be small enough to show the battery charging current and the current for lights and ignition.

The Starting Switch.

The function of the starting switch is to permit the current to flow from the storage battery to the starting motor, when it is necessary to start the car. The starting switch is operated by a lever and push button operated by the foot. The lighting and motor starting wiring systems are independent of each other and may be easily found as that used to convey the high amperage starting current is of heavy round single conductor cable, while the lighting wiring is usually a light multiple strand cable.

One manufacturer of starting motors has two forms of pinion shift. The Bendix mechanical shift, a worm shaft mechanism to throw pinion into mesh automatically without shock when the motor starts and to throw pinion out when the engine picks up. Also an electro-magnetic shift, composed of a solenoid on one end of the motor which throws a spirally cut pinion into mesh with a gear on the flywheel when the starting switch is closed and which releases it when the engine picks up. Either a foot switch or an electrically operated switch with push button control can be used. The motor is entirely enclosed, protecting the interior from dirt, oil and water. The frames are of wrought iron. High magnetic permeability reduces the weight required.

The end frames are machined die castings light and

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strong, fastened with heavy set screws and lock washers. Insulation and baking treatment of the windings make them a solid mass that cannot work loose. It will withstand high temperatures for short periods. The commutator is of ample size to last several years. The brushes are of metal for high efficiency and more power. Sleeve bearings are furnished because of the small amount of use and general satisfaction given by greater simplicity.

The motors are made for use with engines of any capacity up to 1,000 cu. in. piston displacement at a ten to one reduction. They vary in size according to the type of engine they are designed for. The frames are all of wrought iron pipe pressed and machined to size. The commutator end brackets are of aluminum; the rear end brackets are of wrought iron and are arranged to support the motor according to the S. A. E. standard design.

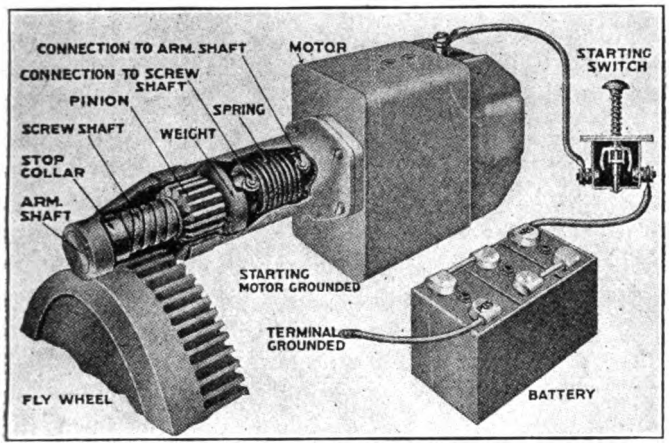


Fig. 4—Motor Starter and Bendix Drive.

Either outboard or inboard Bendix are furnished. The following table shows the motor weight and torque with different engine piston displacements:

Engine Piston Displacement	Battery Voltage	Torque at Standstill	Weight In-board	Weight Out-board
200 cu. in.	6	12 ft. lbs.	20	22
350 cu. in.	6	14	26	29
550 cu. in.	6 or 12	21	30	33
600 cu. in.	6	22	43	—
1,000 cu. in.	6 or 12	31	37	42

To meet the requirements of the varied demands of automobile manufacturers the Bendix drive is made in several standard sizes in both right and left hand models. An inboard application is where the gear moves toward the starting motor when meshing. With the usual position of the starting motor alongside of the engine, ahead of the flywheel, this requires a left hand drive.

An outboard installation is where the gear moves away from the starting motor when meshing. Fig. 4. With the usual position of the starting motor this requires a right hand drive. With the outboard application an outboard bearing is required.

The Bendix drive is divided into two classifications: The "Large Hollow" and "Small Hollow" types, with an added "Special Small Hollow" type. The "Large Hollow" type, R-13 or L-13, is mounted on an armature shaft .802 inch (nearly 13/16 inch) in diameter and is used where such a large starting motor is required.

The "Small Hollow" type, R-12 or L-12, R-11 or L-11, is mounted on a shaft ⅝ inch in diameter and is the type of drive for general purposes.

The "Special Small Hollow" type, R-10 or L-10, is mounted on a shaft ½ inch in diameter, and is used where the special conditions warrant.

Considering the motors alone the efficiency of the single unit set as a motor is lower than that of the motor alone of the two unit sets. This is on account of the greater amount of material subject to losses, the friction of the idle commutator and to the fact that the design is somewhat a compromise between what is desirable for the generator and for the motor. The relative figures are 76% and 74%. Considering also the gearing efficiency, the net efficiency from the motor terminals to the engine shaft is in the one case 68% and in the other only 45%, most of the loss in the latter case being due to the gears. This is a rather serious matter since the cranking speeds with a given current output would be in the same ratio as the efficiency. Thus if the single unit set turned the engine over at a speed of 100 R. P. M., the two unit outfit with the same current would give a speed of 151 R. P. M. In other words, the use of the double or triple reduction gearing leads to a great loss in efficiency. Where a starting motor may be geared to the flywheel at a ten to one reduction the generator would be geared at a one and a half to one reduction.

Summing up for

Operation: The single unit set as ordinarily arranged has a slight advantage.

Weight: For the same cranking speed and the same generator output the two unit outfit is probably 20% lighter.

Efficiency: The efficiency of the single unit set is less than the two unit set.

A Bright Repair Method.

From A. E. Ludwig, Illinois.—The gasket at the front of my differential housing became "chewed" up, probably from loose bolts, permitting grease to leak through. It would require at least ten hours work to take down parts and substitute a new three-cent gasket. I cleaned the parts with gasoline and smeared the joint with a paste made of litharge and glycerine which hardened over night, and have had no more trouble.

Lack of ideas in your think-tank will retard your business just as lack of fuel in the gas tank will stop your car.

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Connecticut Farmers Find Trucks Useful

How Two "Land-Poor" Farmers Owe Their Success to the Motor Truck and Rewarded Their Faithful "Hired-Man," the Collie Dog

BY W. L. ALMY

DOWN in the lower part of the Connecticut Valley where the wooded hills rise on every hand, there is a small village of perhaps eight hundred inhabitants composed of farming folks and the owners of a few necessary stores. In the warm summer evenings one could visit the old corner grocery store and see typical Yankee farmers, tipped back in old wooden chairs upon the piazza, smoking clay and corncob pipes, discussing politics, religion, crops and the war, indiscriminately. During the long winter evenings this same "old guard" may be found sitting around the air-tight stove in the grocery store itself.

Usually during the winter time the air is blue with smoke and all of the groceries taste and smell of this aroma. Whether it is winter or summer the topic holding the most interest is that of the war and sooner or later the talking always drifts round to the fact that the farmer is the fellow who is doing the most to assure victory. These old Connecticut farmers generally have some pretty good ideas and it is certainly interesting to listen in to an evening's conversation.

Two of the men who hold the most attention usually, do not happen to have very many years back of them. They are brothers and own an extremely large farm within a few miles from the village. Their farm is situated upon one of the green hills and their old farm house looks down upon the village far beneath it. Ten years ago these boys ran about barefooted and helped their uncle milk the cows and gather the eggs. Today they own a farm together, and are considered among the wealthiest of the neighborhood. Their success is much greater than many of the older farmers who have been content to till their soil in the good old-fashioned way.

Almost Bankrupt.

Five years ago or just before the outbreak of the war, these boys found themselves in a rather precarious position. They held the title of the farm while a number of other farmers held mortgages upon different parts of it. With the outbreak of the war, the hired man problem began to crop out and the boys saw that unless they did something quickly, their farm would belong to someone else and they would be thrown out upon the world to earn their livings.

They worked from sun-up until darkness prevented them from doing anything more. They did not have time for vacation nor did they have time to attend church on Sunday. The taxes on the farm together with the interest on the mortgages ate up about all they could earn, and the only clothes they had were overalls and rough shirts made for service and not for appearance.

By the time they had weeded one garden the weeds in the other fields were weeks old. When they came to harvest their crops in the fall they found that they had undertaken an impossible task. Many of the potatoes were left in the ground and the fodder corn left standing in the fields. Oftentimes they were forced to feed the milk to the pigs and turn the stock loose into uncut hay.

Their only helpmate was a collie dog and the poor collie worked just as hard as the boys themselves. He would herd the cows together at night, pick up any stragglers and chase them into the barn. The only assistance that he required was the removing of the bars at the field and the bars were arranged near the house. In the morning the collie would make sure that all of the cows were in the field before he had his breakfast.

He seemed to have a mania for watching the turkeys and never permitted them to go very far away from the farmyard. He raised great objections when the ducks chose to swim in the ice pond. He seemed to feel that this was going against all the laws of nature.

The boys themselves certainly had their troubles and though they hated to dispose of any of the farm, they decided that unless they could arrange some way to cultivate all of the land and harvest all of their crops they would be forced to sell a portion of their land. By a strange coincidence, they decided to visit the above meeting of the Yankees around the air-tight stove one night, the first time in many weeks, and this happened to be the evening when an enterprising truck dealer visited the town. When the boys arrived the truck dealer had the floor and in glowing terms was outlining the possibilities of this vehicle.

Like a stock salesman the dealer was showing that all a farmer needed was half an acre of land and one of his trucks to make a fortune. Of course the boys accepted his statements "with a grain of salt" but they began to see the light and decided to "take a chance" at a two-ton truck. For two weeks they bent all of their energies and spent their time in going among the neighboring farmers to obtain another mortgage on their already overburdened farm. They finally succeeded in scraping together enough money for a truck. This was early in July just at the time when the boys were worrying the most.

They had succeeded in hiring two transients who had helped plant the crops and the transients had moved along to bigger fields and more pay at Bridgeport. The boys knew that they would be unable to dispose of all of their

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crops in the usual methods and had about all they could do keeping the weeds away and the crops growing.

The first benefit that the boys derived from the truck was a tremendous saving in time. Previously they had taken the milk to the nearest railroad station, a distance of slightly more than a mile from the farm. They rose at four o'clock in the morning, milked the cows, harnessed the horses and hustled down to the station. With the truck, however, they more than cut the time in two. The truck did not require any harnessing and it went considerably faster than the "old nag." Instead of missing the first train two mornings a week and losing considerable of the milk, they disposed of all of it.



A Fulton Motor Truck. This Particular Style of Body Should Be of General Utility to the Farmer as Well as the General Merchant or Small Manufacturer.

Disposing of Eggs.

Previously they had depended upon a traveling collector for the marketing of the eggs. At times the collector would go around once a month, other times, once a week. He was entirely undependable and the egg money frequently showed a loss. With the truck, however, they carried the eggs to Westerly, a small city about seven miles away and took the profit themselves. As they made this trip once a week they took the opportunity of bringing back their grain and other necessities. They disposed of two horses, keeping one for work in the fields, and when they needed any special field work they co-operated with the neighbors for a draft horse.

As a general rule they collected farm produce from the neighbors when they made their weekly trip to Westerly and in this way saved time for the neighboring farmers who repaid them by giving them a certain amount of labor in their own fields. When hay time came the boys thought that they were "up against it," to use a slang expression, but the problem was easily solved. They made a deal with three of the neighboring farmers and all of the farmers worked together to gather the hay.

The hay was piled into the teams and the truck used to haul three of the teams to the barn where another set of men threw the hay into the mows. One man only was required to drive the truck and a constant stream of teams was kept running between the fields and the barn. All of the men working together harvested the hay in two days and then the boys used their truck upon the next farm where the procedure was practically the same. The truck replaced at least four horses and released at least three men for working in the fields.

The apple crop might have been a failure had it not been for the truck, for the very reason that the price of apples was so low that it hardly paid to market them. However, when the apples were taken to Stonington the

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prices obtained were large enough to give a liberal margin of profit for the trouble.

The same thing was true of the peach crop, except that the peaches brought considerably higher prices and the main problem was to get them to the market before they spoiled.

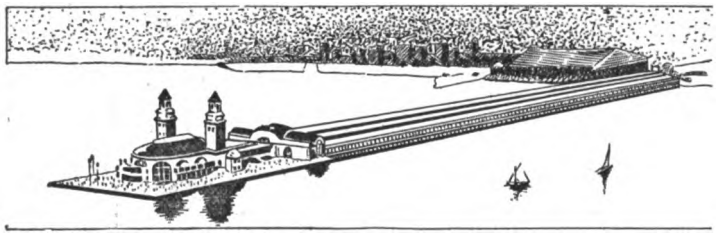
The Collie's Reward.

The only one who did not profit greatly by the introduction of the truck was the poor collie. He still had his regular chores to do and perhaps was just as well satisfied. He did derive considerable pleasure, however, or seemed to at least, in sitting upon the truck seat "talking" to the engine. The boys have not as yet taught the dog to drive, but doubtless sooner or later he will be able to take up this branch of the work too. Nothing pleases collie so much as to be allowed to ride on the seat, or more literally, the dash, for he usually has his nose about six inches ahead of the machine most of the time, and he seems to be willing to run about the farm all day provided he can get a ride to the station, on the truck, in the morning.

GOVERNMENT APPROVES.

The Government Has Reserved Display Space at the National Exposition of Trucks, Tractors and Equipment, at Chicago.

THE Federal and various state governments have given their approval to the national exposition of trucks, tractors and automobile equipment at Chicago's Municipal Pier, September 14 to 21, by reserving display



space in which to exhibit war-time features of governmental work. The United States government will also, in all probability, take advantage of the thousands of visitors at the exposition to maintain a complete recruiting office on the pier.

With six weeks to wait before the opening of the greatest automotive exposition ever held, the management is already confident of establishing new records in every department. As a matter of fact, the number of exhibitors who had signed up for space by July 1 exceeded the total number of exhibitors at the exposition last year.

Last year's show, the forerunner of this exposition, was held at the famous Coliseum. It would take three or four Coliseums to house the 1918 war-time exposition. The Municipal Pier, being the largest exhibition place in America, is the only building large enough to accommodate an event of such magnitude as the truck, tractor and accessory exposition has already attained.

The entire northern section of the pier—a floor space half a mile long and about seventy-five feet wide, without a single obstructing pillar—has been reserved for display spaces.

The great auditorium, which seats 4,000, has been reserved for the meetings of hardware men the first two days of the week, and for the threshermen of Illinois, Wisconsin, Iowa, Indiana and Ohio on Thursday and Friday.

Musical programs have been provided for the exposition and, with the music of the Jackies' band stationed just across the driveway on the south side of the long pier, visitors to the show will have plenty of musical entertainment.

The Pier is very easily reached from any railway station or hotel in Chicago. The surface cars all give transfers and make direct connections for the Grand Avenue line which runs clear out to the end of the Pier, almost a mile from shore. Automobiles and taxi-cabs use the broad concrete roadway, while the street cars run on elevated tracks. The north shore bus line stops at Grand Avenue within easy walking distance of the Pier, and no one need fear that it will be difficult to reach the exposition. The Pier is just outside the "loop," but it is the easiest place in Chicago to find because all Chicago is justly proud of its $5,000,000 recreation center and show place.

THE RATTLED KING.

By WALT MASON.

"MY kingdom for a horse!" he yelled, the king who once a scepter held. His frantic cry has won renown; by poets it is written down, and it is thundered on the stage by actor kings of every age.

Why was his royal nobs so sore? Why did he put up such a roar? His touring car had broken down, and he was nineteen miles from town. He knew not how to make repair, so he could only stand and swear, and cry, "Oh, harken to my rede! I'd give my kingdom for a steed! For I am sick of choo-choo carts; they're only made to break men's hearts, and put the whole world on the blink, and drive poor dippy kings to drink.

"Ods fish! Gadzooks!" the monarch cried, "How happily I used to ride, on my old swayback sorrel mare! I traveled on her everywhere; she galloped, trotted, loped and walked, her carburetor never balked, she never called for gas or oil, however hard she had to toil, her steering gear was always true, in age she was as good as new.

"But since I got a motor car I never travel very far; the differential's out of whack, or else a tire splits up the back; I'm always paying hard earned scads to husbandmen and other lads, to haul my bumboat back to town,

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because the blamed thing's broken down. And so I stand and chew the rag, and cry, My kingdom for a nag!"

Then came Sir Galahad that way; his car was running smooth and gay. His motor sounded slick as grease, and his brave spirit was at peace. He heard the monarch's doleful cry, and said, "My liege, 'tis vain to sigh. Why fool with that old tinhorn boat, which always gets your royal goat, when you might drive a Haynes, like me, and find your life a thing of glee? Why monkey with that punk old barge, which shouldn't be allowed at large, when you could shed your spirit's pains by driving round a Light Six Haynes? I never have a care or woe; my car runs sweet, where'er I go; it takes the highways as they come, and it is never on the bum. Get in my liege, and take a jaunt, and then you'll see the car you want."

The monarch rode nine versts or ten, and then he cried, "Oh, ne'er again will I go snorting o'er the plains in any wagon but a Haynes!"

Practical Suggestions from Mississippi

Our Happy Southern Friends Are Strong Competitors of the Connecticut Yankees For Ingenuity in Automobile Repair Work

BY JAMES F. HOBART, M. E.

IN most garages the practice is followed of using a box for containing the small pieces of the mechanism and a good deal of time is saved by having the pins, collars and other small pieces thus safely isolated from other jobs which might be in the shop. But still more satisfaction may be obtained, and a good bit more time saved, by using boxes of similar size and shape, and made as perfectly adapted as possible to the work they are intended for.

The box shown by Fig. 1 is about 20 inches long, 10 inches deep and 10 inches wide. In either end there is a till, made by rabbiting in two pieces when the box was made. The body of the box A was made of 13/16 inch cypress lumber, the tills B and C were of stuff slightly thinner, say ½ inch thick. It was suggested that these boxes be made of galvanized steel, but the garageman suggested that he had used steel boxes himself and did think they were good—until he tried a few. He summed up the business by saying: The wooden boxes don't last quite as long as the steel ones, but the latter are rattling abominations—always making a clatter and getting bent out of shape, and I do not care to have them in the garage. The wooden boxes are O. K., and if a man would spend a bit of time in binding the top edges and the corners with strips of metal, the boxes would be practically indestructible and last as long as the garage.

In either end of the box the tills B and C serve as containing places for the smaller parts of the mechanism. The till C is seen to be a bit wider than till B, and may be used for the coarser of the smaller parts, while till B is used for the nuts, washers, pins and set screws and other smaller parts of the machine. In setting up the car again, it is found very convenient indeed, and there is very little time lost in selecting the required pieces when setting up the automobile again after it has been pulled apart for overhauling or repairs.

While Tungsten contact points are not as good as those made of platinum, it cannot be contradicted that tungsten points last longer than those of platinum because they are so much harder. But tungsten points, in order to do good work, must be ground (you can't file 'em) perfectly flat and true, and in such a manner that the two opposing points will come together fair and square. Fig. 2 shows how the points should and should not be fitted.

In Fig. 2, the two points shown at E fit together so perfectly that scarcely a line can be seen at E, where the two points touch each other. This is the way the

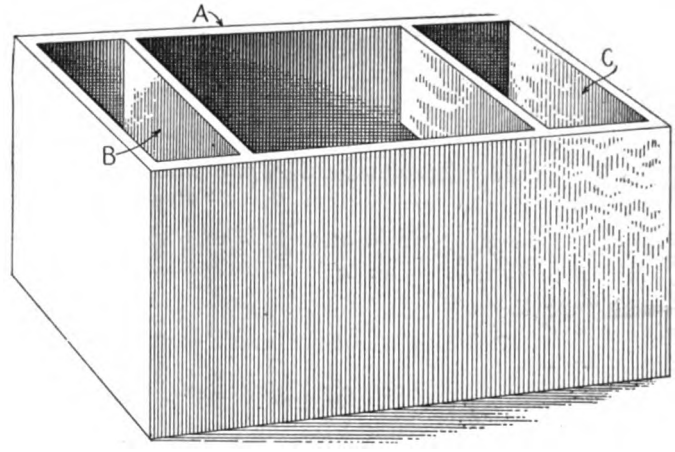


Fig. 1—A Handy Parts Box.

points should be fitted. But when points are left as shown at F, touching only at one side, there is every possibility that a weak spark will be the result of such fitting.

As stated, it is almost impossible to fit together by grinding two points and have them appear as shown at E, Fig. 2, unless the grinding be done in a well made jig which has been specially constructed for the contact points of the engine under repair. It is possible to fit points by repeated grindings and testing, but it is not a profitable operation and the mechanic is pretty apt to quit the attempt long before the points fit together as they should.

The contact points to be ground are shown in Fig. 2

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at D and M. That at D being the movable point and mounted upon the lever N, which in turn is hinged at O. In grinding this point, it is absolutely necessary that the plane of the point-end shall lie along line (dotted) P Q, which passes through the center of pin O, and lies fair with the end-face of pin D. In like manner, dotted line P Q will pass across the end-face M of pin L.

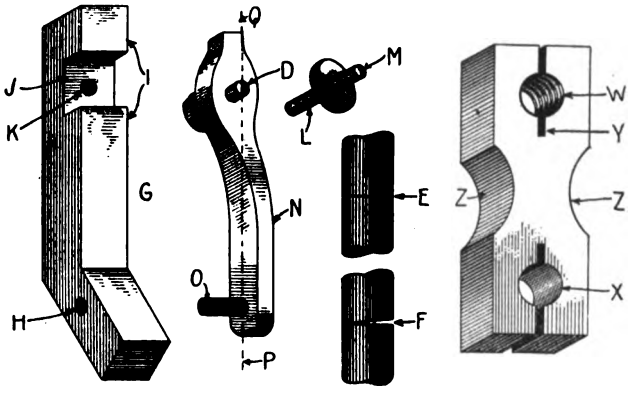


Fig. 2—Jigs for Grinding Points.

The jig G serves the double purpose of holding both pin and lever G and the movable point L M. To grind the lever-pin, slip pin O into hole H, then apply pin D to the grinding wheel or to the surface of an oil stone, if the grinding is to be done in that way. Then, the face of jig N will guide the point, hold it and lever N, fair and square at all times, and cause the grinding to be done square, no matter how much of pin D may have been worn away, for the shorter that pin may be, the more lever N will swing down, and as shown at E, Fig. 2, will always be kept squarely in line.

The grinding will of course cause some wear to jig G, Fig. 3, but if properly handled, the wear will be very slight and negligible for a long time. Eventually, a new jig will have to be made or a piece of metal soldered or welded to face I, so as to keep hole H directly in line with face I.

Grinding the Stationary Point.

For grinding point M, the pin L is simply slipped into hole K in jig G, the slot J having been made sufficiently large to permit the check-nut of pin L to enter the slot in question. Then the check nut is adjusted so end M projects slightly above the surface I, after which the pin is ground right down smooth with that surface and pin L will be found so square-ground that end M will fit perfectly against point D, when replaced in the auto mechanism.

If a bit of care be taken when using jig G to keep the surface I as it grinds away always in line with hole H, then the swing-lever point D may be ground indefinitely, but this scheme will not work with the stationary point M. The hole K must always be kept square with the dotted line P Q, in order to grind the end of L pin properly. A little care in using jig G will take care of the wear and the jig will last for years with a good deal of use. But, with a little carelessness, the jig may be put out of business in ten minutes.

By rigging bearers for the jig G, on either side of the grinding wheel, the jig may be made to last indefinitely, as all wear therefrom will be prevented. It is easy to arrange a guide for that purpose. A piece of metal with a hole in it may be clamped in place over the grinding wheel, the strip adjusted exactly level with the surface of the wheel by clamping it to the tool rest, then the jig G should be made long enough that it will reach across the width of the wheel and bear entirely upon the metal placed there to receive the jig. With this arrangement, the jig can be used until the holes become worn. There is no wear at all upon the jig itself.

Tool and Display Rack.

While in the shop where the point-grinding jig was found, the writer noticed a fine rack of shelves, then doing duty for the storage of tools and auto parts. But the rack of shelves had evidently been originally intended to be used in some exhibition.

The manner in which the rack was constructed proved very ingenious. The four corner posts R, R, Fig. 4, extended from top to bottom of the rack and each of the shelves were cut to a true miter, as shown at U, between the shelves S and T. Then the corner post was cut right into the end shelf S as visible at V, leaving the front side of each shelf and each leg flush and smooth as shown at U.

This form of construction proved very easy to handle and the stand or rack was easily put together in that manner with little trouble in obtaining good joints and solid connections between the legs and the several shelves which were placed about seven inches apart, thus leaving a trifle more than six inches clear, between each row of shelves.

Each end shelf was nailed firmly to the legs, then the front shelf was nailed both to the legs and the end-shelves, making a very strong and stiff form of construction. A strip of board not shown in the engraving was placed across the rear legs, near the bottom thereof, when the first or lower shelf was put in place. Then the top shelf was put in place and this, with the strip across the back, served to hold the construction firmly, not only during the setting-up, but afterwards as well.

This rack, placed against the wall, and loaded with tools and auto-parts, proved a very interesting and convenient piece of property which might be frequently used in shops or stores.

Run a Die Over Studs.

When taking a radiator off, some of the stud bolts came out, while others stayed in place and their nuts came off as was desired. But it was noted that the careful mechanic who was doing the job "freshened up" the stud threads before he replaced the nuts thereon. Those which stayed in place he treated by running the thread-

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die over them. The die stock was not needed, a square die being used and turned by a wrench, a common monkey wrench being used for the work.

The stud which came out (because the nuts were stuck fast) had their nuts removed in a very simple manner. A square nut was selected which fitted closely to the thread of the stud. A cut was made with a hacksaw right through one side of the nut, after which it was screwed upon the stud, close to the end which should not have come out of its thread in the radiator foundation.

The vise was screwed tightly against the split nut, which was thereby forced against the stud thread hard enough to so hold the stud that the "stuck" nut could be removed. After that had been done, the stud was treated to a run-over with the die and was replaced in the foundation. The split nut proves a mighty good thing with which to hold studs and other screws upon which work is to be done and which are to be held in a vise. When work, either filing or polishing, is to be done upon a screw head, the screw may be securely held in the vise during the work by making use of a nut, split as above described.

Vise Clamps.

For holding round rods, pins, valve stems and "sich like," the garageman may easily make up vise clamps by drilling or reaming square nuts or bits of bar steel, until they will slide snugly over the round articles to be held. Then, by clamping the split smooth nuts around the object in a stout vise, the round shapes may be held securely and safely. It costs very little to make up a set of such vise-clamps, both for threads and for smooth rods, the clamps varying in diameter according to requirements of the work to be done, from one-eighth of an inch up to an inch or more, by sixteenths, or by thirty-seconds of an inch, as required.

Also, there should be both smooth and threaded vise clamps for the several sizes, and it would be well to make a case to keep them all in, something like a printer's type case will answer pretty well. One of these, a "cap case," will be found mighty convenient in the garage, not only for vise clamps, but for containing many other small things as well.

If you are willing to provide a little time and stock, you can easily make up a set of vise-clamps which will prove far ahead of the split-nut clamps in convenience and in utility. These clamps may be cut from bar steel, something as shown by Fig. 5. Thus, instead of using a nut for each size, and separate nuts for the smooth and threaded clamps, get out some pieces of steel long enough for two clamps as shown, then drill and thread hole W for a certain size of screw and drill hole X just large enough to slip over the body of the screw. It will be well to grind or mill out the sides at Z Z, thereby giving more spring to the steel between the holes W and X.

After the drilling, threading and grinding has been finished to suit, saw in at Y, at each end of the clamp, letting the saw run some distance below the holes as shown. This will still increase the spring-action of the clamp. After completing the clamp as above, be very careful to remove every corner and every vestige of roughness and sharp metal from the clamps. Indeed, it is well to put them into a tumbling barrel and let each and every corner be worn and smoothed off, after which the clamps are ready for use and the great efficiency and convenience of these appliances can only be fully obtained by arranging some means for keeping the clamps in such a manner that any one required may be instantly selected for use with absolutely no hunting therefor. If you lose time in hunting for things like these, then their efficiency is greatly reduced, if not entirely destroyed. Therefore, arrange some method for storing and keeping the vise-clamps so the hand may be placed at will upon any one. Then they will be efficient and worth having.

Cutting a Gasket.

The usual practice, when cutting a gasket, is to place the sheet of rubber or fiber over the surface to be fitted, hold in place with one hand and pound around the edge

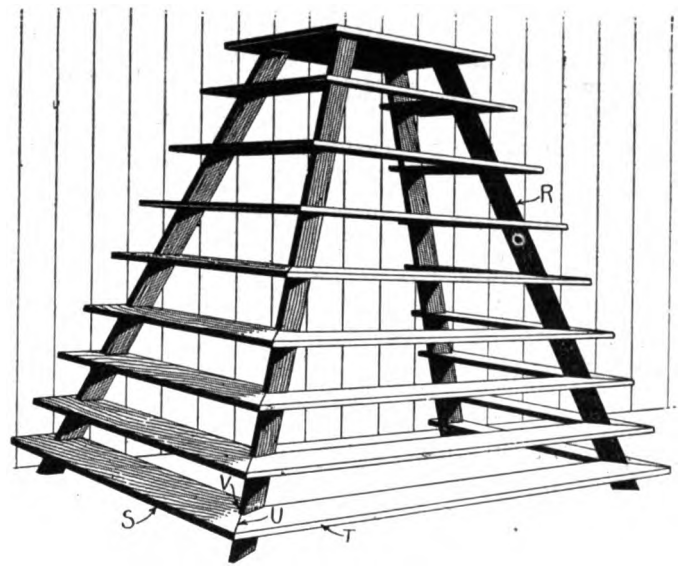


Fig. 8—A Handy Display Rack.

of the casting with the first hammer you can lay hands on, then pull off the rubber around the body of the gasket and put it in place.

But that is not the best way. Place the gasket sheet in position, lay a bit of heavy metal on the gasket to assist the hand in holding it in place. Then select a small light hammer with a well rounded face and carefully hammer around the edges of the casting until the gasket is well separated from the excess material.

But the gasket is not yet ready to be put in place. Do not use it with the edges rough and ragged. Place the cut-out gasket on a smooth board and trim the edges with a very sharp knife, or, if you prefer, with a pair of scissors. A gasket made in this way fits well, does not collect dirt along its edges and with the light hammer there is less danger of battering the edge along which the gasket has been hammer-cut.

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MAY THE WORLD BE ILLUMINED BY THE LIGHT OF LIBERTY

The Arabian Nights' Tale of Alladin and His Wonderful Lamp Modernized

ONCE upon a time, in a fertile valley, surrounded by green hills and filled with golden grain, there lived a man whose first name was Alladin. Like the old Arabian, Alladin was shiftless and could not see the piles of gold around him—until—one day there arrived at Alladin's house a wonderful magician who imparted a secret to him and gave him a talisman, which Alladin had only to touch, to obtain wealth and riches.

Alladin simply mingled with his friends and amassed great wealth and his name stood for money. Alladin of this tale, did not live in Arabia, he lived in America and the wonderful magician was a tractor salesman who gave the opportunity to Alladin—his secret was—"Sell Tractors."

The Proposed Normal Tax on Gasoline Should Not Cause Us Much Worry

THE new proposed tax on gasoline and upon automobiles is exciting considerable comment, but we trust that it will be accepted philosophically when the people realize just what it means. What automobile owner is there who feels that he is not willing to support our boys at the front? Is it our place to complain because the Government asks for our support? Is it our place to complain when the boys on the other side are sacrificing their lives? Even more than that, many of these boys are sacrificing their business and their glowing futures for the cause.

We should be proud of the fact that we are able to furnish the money. What is your automobile worth to you? What is your home worth to you? What is your business or all of your property worth to you if germany conquers? Absolutely nothing!

Consider this tax as an investment which will bring you 100% dividends. The more money we pay, the more men we put upon the field, the sooner we will win the fight and then our troubles will be over. Every time you pay a tax of any sort, remember what France is doing!

Everyone Should Be Loyal, Help Us To Spread the Feeling of Patriotism

WE publish an automobile magazine and it is our intention to make this magazine the best on the market. We feel that you agree with us when we say that there is no magazine which gives as much real mechanical information, or to use the slang phrase, "good dope," as the Automobile Dealer and Repairer.

At times we feel that we are badly handicapped in our editorial pages. We are torn between two forces. We want to be patriotic and at the same time we do not want to be misunderstood by our readers. Patriotism today should be the ruling factor and we willingly bow to this force. We trust that our readers will bear with us, if in our editorial pages we happen to give considerable space to our patriotic expression.

We are not on the fence, neither are we neutral. We are for America, and we try to do our part in arousing public sentiment for America. We mean to express this sentiment so thoroughly that should the villain of Potsdam read our editorial pages he would be ready to consign us to the fate of the defenseless Poles and Belgians.

America must win the war and every civilized person in the world today should be made to realize that the fight is between civilization and barbarism. We appeal to our gentlemen readers, to our subscribers who are real men and who do not agree that the bayonetting of children is royal sport—to fight the hun and his creed.

Let every sentence that you say contain the American spirit of ability and courage. Spread this courage through your community. If you meet a pacifist or a half-hearted American, bring forward some of the facts about the war. Make his blood boil with these facts. You don't have to hunt very far to obtain these facts. Read your daily papers.

Read of the sinking of hospital ships, the slaughter of stretcher bearers in the field of battle, the abuse of the American captives in german prison camps. Call the attention of your wives to the german atrocities

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practised upon their defenseless women captives and the peasants of Belgium. Preach Americanism and civilization in your pulpits. Spread this doctrine so widely that the question arises, "How can we afford NOT to fight?" and put your argument so strongly that no single voice brings up the question of WHY do we fight? Add your voice to the general clamor for victory.

America wants peace. We want peace, but we don't want peace until we are sure that hunism and vandalism is buried so deeply that its ghost can never frighten our children in the future. We want peace so badly that we will sacrifice all of our wealth if necessary to conquer germany, for only in this way can we secure peace. German promises to us will be just as valuable as they are to the Ukraine. We want peace—but we intend that VICTORY shall come first!

Fight for Freedom !

Two Articles To Be Published That Every Car Owner Should Obtain

EVERYONE who reads this magazine will notice the leading article which presents the service truck in an entirely new light. Surely every reader will enjoy reading about the "Patients and the Diagnosis," our leading article for next month; all about the sick cars, their numerous ills and troubles and how to be the physician to your own automobile. The story will tell you of the "various diseases," their "symptoms" and how to "diagnose" them, in fact—but read it, then you will appreciate it the more.

Above all, don't fail to read our first October article entitled, "The Undertaker and the Graveyard;" it reads like a story, but it contains some real "honest to goodness" mechanical information.

You can get these numbers of the magazine free if you care to—read the 15 months for $1 subscription offer. Like the moving picture theatre, we announce,

"Coming: The Patients and the Diagnosis."

"Coming: The Undertaker and the Graveyard."

One of the Big Things That Automobiles Have Done Toward Winning the War

WE feel safe in saying that the great success of the Allies can be traced directly to advanced engine design. This means that those countries which are fighting for justice are more advanced in the science of automotives, both as regards land vehicles and airplanes.

The motor truck has been an important machine, its descendant, the tank, has been more important, while the airplane, both figuratively and literally, has soared high above. Supremacy in the air means success in war, and it is our superior knowledge of machinery that has enabled us to produce superior airplanes. And when we say "our," we refer to the Allies.

The civilized world owes much to the humble automobile. In this machine we find the nucleus of mechanics. Those nations which produced the best automobiles, now produce the best airplanes, because their people are educated in automotives.

Our young American "fighters of the air" owe their ability to their familiarity with the automobile. At the present time, hundreds of mechanics are needed, men familiar with gasoline engines, and our country can produce this sort of men, because so many of our people own automobiles and know how to operate them.

One Way of Conserving War Materials Is to Employ Substitutes Wherever Possible

IF you are a repair man you should realize that the price of leather is going up very rapidly. The reason for this is that this product is badly needed for army shoes, leggins, etc., and you should be governed accordingly. When one of your customers comes into the garage and asks you to re-upholster his car, don't suggest that it be upholstered in leather. There are many grades of imitation leather on the market today which are practically as good in every respect as real leather.

These fabrics resemble leather and wear as long if not longer than the real product. Imitation leather fabrics are easier to work with than leather skins. Much of a skin is wasted in cutting, whereas imitation leather may be had in various weights and lengths. Imitation leather is pliable, and does not age or crack upon weathering. Aside from the fact that you will be doing a favor for your customer, you will be doing a loyal deed for the boys at the front. They must have shoes or they cannot win the war and every year that the war is prolonged your expenses will increase.

Conservation—If You Read This Magazine Thoroughly, You Won't Need Any Other

WE don't care whether you are a dry-goods salesman or an automobile owner, whether you are an actor or a machinist; you should read this magazine. Perhaps you think that our statement is rather broad, but we have a reason for our lavish claims. Our magazine is original; if you don't believe it, turn to our first story and read it through. Don't you think that this article is different from anything you have ever read? Even if you are not interested in things mechanical, doesn't this little story appeal to you?

We try to have our whole magazine appeal to our readers in the same way. There are two ways to write a mechanical story. We might fill the book with a lot of mechanical facts and long rows of figures; items that would give even a machinist a headache to read—but—that is just what we won't do. We make every mechanical article, a story, easy to read, yet containing mechanical facts and suggestions.

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The Metal Turning Lathe

Part 1.—The Metal Turning Lathe Is an Essential Tool in the Modern Repair Shop and This Article Tells How To Install It

BY J. F. SPRINGER

THE most useful of all power-driven tools used for cutting metals is the turning lathe. There may be other power tools which the repairman will have to purchase before he invests in a lathe, but they are not many. He may have to buy small tools and perhaps a drill press before installing a lathe. However, small tools cannot be used to turn and shape metals, while a lathe will do a large percentage of the work done on a drill.

An engine lathe has but few power driven parts. The spindle in the headstock is the principal one. Its function is to provide rotation for the work in order that a tool may be held against the piece and metal removed. The work may be held on a face plate or in a chuck or between centers. In any of these cases it is the spindle that provides rotation. In fact, rotation of the work is, on the ordinary lathe, provided in no other way. The spindle then is a most vital part of the lathe.

Other moving parts of the lathe have to do with the lead screw. All the movements have to do with the feeding of the cutting tool to the work or the reverse. No rotations of the work are dependent upon the lead screw or related parts. Cutting tools are fed to the work, as a rule, either by the hand or by means of a tool holding device controlled by the hand. But whenever considerable force or great regularity of feed is sought, the power driven lead screw is naturally brought into service.

Relation of Lead Screw to Spindle.

Now it so happens that the lead screw is driven by the spindle or the mechanism concerned in driving the spindle. Moreover, in general, the rotation of the lead screw is absolutely controlled by the rotation of the spindle. The speed of the latter absolutely controls the speed of the former. Thus, when the spindle turns round once, the lead screw will turn round a certain definite number of turns—as three turns, two turns, one turn, or half a turn.

It may be gathered from the foregoing that the spindle and the lead screw are two vital parts of the moving mechanism of the lathe. This is true. If we are about to purchase a lathe, we will advantageously center a very large part of our attention upon these parts and the parts with which they connect.

The spindle is in the head stock and if it runs true and at desirable speeds, we know that a large part of the essentials of a first rate lathe have been covered.

In order that the spindle may run true and continue to do so in spite of wear, the following specifications should ordinarily be met. (1) The two bearings should be wide apart. If one wears faster than the other, the distance between the bearings will tend to minimize the effect upon the work. (2) The bearings should be broad. The inevitable wear will then be spread over a considerable surface with the result of lessening the depth of wear. This is what we want.

Figuring Spindle Speeds.

As to proper speeds. If the lathe spindle is driven by means of a cone-pulley, then the fastest speed will be secured when the belt is on the smallest step, and the slowest speed (in case there is no back gearing) when it is on the largest step. If there are four steps, we can very readily get a good range. Suppose the countershaft runs at 130 revolutions per minute (R. P. M.). It will not be difficult to determine the speeds of the spindle corresponding to the various possible positions of the belt.

Divide the diameter of the step of the countershaft cone-pulley by the diameter of the lathe cone-pulley and multiply the result by the number of revolutions per minute of the countershaft. Suppose, for example, that the smallest step of the lathe cone-pulley is 5 inches in diameter and that the corresponding step on the countershaft cone-pulley is 15 inches and that the countershaft speed is 130 R. P. M. We divide 15 by 5, giving 3 as a result and then multiply by 130. Then the spindle speed will be 390 R. P. M.

Let us now consider the slowest speed. Suppose the two steps have diameters of 7 and 14 inches, the countershaft cone being the smaller this time. We first divide 7 by 14, giving .5, then multiplying by 130 we find that the spindle will run at 65 turns per minute.

These speeds may be suitable or they may not. Note that the fastest speed is six times as fast as the slowest. We can't change this relation between the fastest and the slowest without changing the lathe or countershaft cone-pulleys. See Fig. 1.

However, if we simply want to make all the speeds of the spindle faster or all slower, we may do that without altering either cone-pulley. We may simply arrange to run the countershaft itself more rapidly or more slowly. We may do this by using a smaller or a larger simple pulley on the countershaft to correspond with the pulley on the line shaft.

It is important to have the speeds of the lathe right. If the lathe cannot be slowed down sufficiently, we may expect difficulty or loss of time. Similarly, if it cannot be speeded up to the proper point.

If the slowest and fastest speeds are both right, then

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we may rest fairly content. The maker of the lathe will naturally arrange matters for suitable intermediate speeds. A four-step cone will give four speeds. For general use in an automobile shop, four speeds will be sufficient. Five steps will only serve to enable the workman to change a little less abruptly from one speed to the next. However, if the shop is going to do work where very slow speeds are required as well as the faster ones, then it may be well to consider the added expense of installing a lathe fitted with back gearing.

Back Gears.

Back gears arranged at the head stock of the lathe provide another set of speeds. If we have a four-step cone, then with back gears we can obtain four slow speeds in addition to the four fast speeds. We have a complete new set of speeds. The back gears may be so arranged that we get a reduction of say one to eight. Or, it may be stated that the back gear ratio is 8. Either way, the meaning is the same. The new slow speeds are one-eighth as fast as the old fast ones without the gears. That is to say, we get a new slow speed for every position of the belt on the cone pulley.

It will be one-eighth as fast as the speed for the same position of the belt with no gears used. In the example, we had before, the slowest speed was 65 R. P. M., obtained at the time when the belt is on the largest step on the lathe cone. If the back gears are now brought into action and the belt remains in the same place, then the new speed will be slightly over 8 R. P. M. (that is, ⅛ of 65). When the belt is on the smallest step, we get instead of 390 R. P. M. the speed of about 49 R. P. M.

In selecting a back-geared lathe, an important matter is the jump from the fastest back-gear speed to the slowest speed without gears. In the present case we have about 49 for the one and about 65 for the other. That is a big jump. Unless we absolutely know that this jump will not be too big a one, it will perhaps be better to obtain a lathe with back gears having a ratio of 7 instead of 8. With 7 (or 1 to 7), we shall now have new speeds that are one-seventh of these of the old set. Thus, corresponding to 390 and 65, we shall get with the gears 56 and 9 (about). The jump from 56, the fastest speed, with gear to 65, the slowest speed without gear, is a reasonable one—one that is a very great improvement over the jump from 49 to 65.

Let me summarize some main points. If the lathe in contemplation is driven by a cone pulley and does not have back gears, then we shall have exactly as many changes of speed as there are steps on the cone. If the lathe is back geared, we get an additional set. Find out what the fastest speed on the lathe is and also the slowest, when the countershaft is rotated at the speed at which you propose to rotate it.

If the fastest speed is not fast enough, or the slowest not slow enough, then consider what to do. It is possible that a change in the countershaft speed may give you what you desire. Make the calculations, or get some one to make them, and see whether the fastest and slowest speeds will now be satisfactory. If not, then leave that particular lathe alone. Further, if you are about to get a lathe with back gears, find out what kind of a jump in speed is made when you go from the slowest without gears to the fastest with gears.

If it means a doubling or anything like a doubling of the speed, it will be well to consider before you buy.

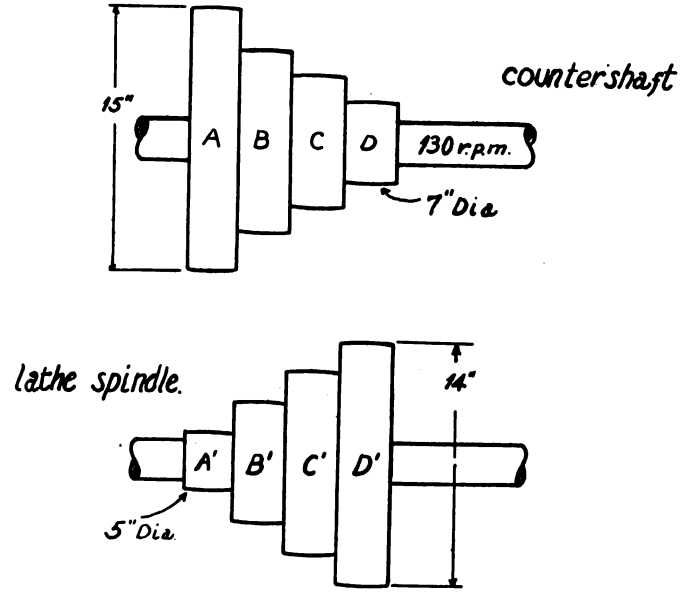


Fig. 1—Countershaft and Lathe Pulleys.

The jump may be a permissible one for you or it may not. At any rate, stop and consider. A back geared lathe costs considerable more money. It will be well to make sure you are getting what will prove satisfactory.

The speeds desirable on a lathe will depend upon the work to be done. Hard cast iron and tool steel will require comparatively slow speeds. Soft brass should be cut at a comparatively high rate of speed. Machine steel is properly cut at intermediate rates. We can vary the speed some, but not to a very great extent, if we propose to operate economically.

We must consider what kind of work we are going to do. If there is going to be a good deal of soft brass work of small diameter, then we will want some pretty rapid speeds. Soft brass should be cut at the rate of, say, 100 feet per minute. This means that the chip should come off at that rate. This is a different thing from 100 revolutions per minute. If the brass work on the lathe is 1 inch in diameter, then the chip taken off in one turn is about 3 1/7 inches long. To get 100 feet of chip, we will have to have as many turns as 3 1/7 inches go into 100 feet. One hundred feet is 1,200 inches. Dividing by 3 1/7 inches, we get 382 turns (about). If we want 100 feet of chip in 1 minute, then we will have to rotate the work fast enough to get 382 turns in 1 minute. From this is will be seen that the spindle speed of 390 R. P. M., mentioned a little while back, will not be too rapid. We obtained that speed from a countershaft speed of 130 and pulley steps of 15 and 5 inches on countershaft and lathe cones.

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THE POOR MAN'S WAR.

The curbstone critic fished a 5-cent cigar out of his pocket and aired his views.

"It's not my war—or yours. It's a rich man's war. Let him fight it."

The man in the overalls with the dinner pail, who had stopped to wait for a car, butted into the talk.

"Where did you get that hunch, friend? My boss has two sons. Both of them are at the front. Neither could have got exemption if he had tried, and to give them their due they didn't try. Now take me. I've got three grown sons. One has a wife and two kids. He'll stay at home to support them. One works in a shipyard. He'll stay in this country. The third drives a truck. He'll go to France. You've got to show me before I'll believe it's a rich man's war."

"He's making money out of the war and we're paying for it, aren't we?"

"Some rich men are making money. Some aren't. I notice stocks are away down. That hits them. When it comes to paying for the war, I reckon we're all doing our share. The income tax and the supertax, and the excess-profits tax all hit him. It's the first war I ever heard of where the capitalist pays his proportion. Of course the workingman pays, too. I pay on tobacco, and the wife and kids pay when they go to the movies. That's right, too. They're not necessaries. I like to think I'm taking a wallop at the kaiser every time I light up. No, sir; the rich man hasn't any monopoly on this war. It's my war, too."

And the man with the dinner pail swung on to a car so as to get home to work in his war garden.

Concerning the Heart of the Automobile

The Automobilist Should Familiarize Himself With His Machine and Thoroughly Understand the Battery

BY WM. H. STEWART, JR.

IT is a very peculiar fact but true nevertheless, that a hard-headed business man will invest two or three thousand dollars in an automobile and then cease to take necessary precautions in safeguarding his investment. Such a man may be likened to a minister who invests in mining stock without trying to learn anything about the stock market or the output of the mine.

A man who owns an automobile should familiarize himself with the machine if he expects to drive it himself or even ride in it. Last night as I walked down Broadway, near Times Square, I noticed a crowd of people gathered around a large car, the price of which is well over $2,000. The owner apparently was driving the car himself and evidently was in trouble, so I stopped to see the reason for it. At the time, his car was in the middle of the street, all of the lights were out and the man was evidently pressing on the starting button and getting absolutely no response from the engine. To add to the man's confusion, the traffic officer arrived upon the scene and scored him heavily for driving the car with no lights.

The man protested, saying that it was not his intent to break the law but that the electrical system had evidently failed. Naturally, this made little or no difference to the traffic officer, and I do not doubt but what the man was, or eventually will be, hailed into court and fined for breaking the law. I claim that the man was entirely to blame because he did not know his car. In fact, he didn't have any suggestions. The only thing that he did know how to do was to press on the starting button. Naturally the engine would not start because the whole electrical system had gone wrong. The man suffered and so did the storage battery.

If the man had been wise he would have traced the wiring from the storage battery to the ignition switch, since it must have been that the trouble was along this line, else all of the system would not have failed. At the switch, all of the wires branch off to distribute the current to the various lights and the ignition unit. Since all of the lights and the unit failed, the trouble must have been between the distributing point and the battery itself, but since the battery operated the starting motor. the battery must have been in condition, going to show that the wiring was at fault.

This wiring could have been traced inside of three minutes and the trouble averted, had the man educated himself.

Storage Battery Important.

The storage battery is one of the most important units of the car, yet it is a device which seldom receives the proper attention. All that the average car owner knows about this unit is that it requires a certain amount of distilled water occasionally. I have often seen storage batteries in use that did not receive even occasional attention. Literally, they were starved to death.

The electrolyte, unless it is replenished frequently by the addition of distilled water, will drop below the upper

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edges of the plates, cause excessive sulphation, and result in lost capacity. The general tendency is to blame the battery for the trouble. In the first place every new car owner should test his battery at least twice a week in order to familiarize himself with the conditions existing on that particular car. If the charging rate of the generator is high or if the starting motor is used excessively, the electrolyte will be dissipated rapidly, thus requiring frequent additions of water.

The storage batteries upon some cars, particularly those that are used steadily during the daytime and only occasionally in the evening, may require an addition of water twice a week, some batteries only once a week, while still others only twice a month. All of the construction books make a strong point of this fact and if the owner cares to protect his investment, he will spend the time himself or be sure that his hired mechanic will take care of the battery.

The Heart of the Automobile.

The battery may be considered as the heart of the automobile and when it fails the automobile stops. Storage batteries today are badly abused. The owner jumps into his automobile, pushes on the starting switch and waits for results. At times he waits for three or four minutes before the engine starts. He seldom makes sure that there is gasoline in the carburetor or that the ignition switch is turned on.

When an engine is in good condition it will start within fifteen seconds. If it does not, then the operator should locate the trouble before he abuses the storage battery, for continued use of the starting motor means the abuse of the battery. When the starting button is pressed, as much as 200 amperes of current may be drawn from the battery. This means excessive chemical action in the battery and if continued any length of time, the battery is sure to overheat. Continued abuse soon results in a damaged battery. The plates will buckle, the separators will disintegrate, and the electrolyte be boiled away or dissipated in the air. The active material is driven from the plates and falls to the bottom of the cell, resulting in decreased capacity.

Sooner or later the battery becomes a useless piece of junk unless it is used carefully. Excessive use of the storage battery is one extreme. The other extreme is had when the storage battery is used but little and the car used much. Every time a battery is charged and discharged, a certain amount of the active material is driven from the plates and falls into the basin at the bottom of the cell. We have seen that if the discharge is rapid, much of this active material is thrown off. If, on the other hand, the battery is excessively charged, the same thing will result in a minor degree.

Suppose for instance, your car is operated for ten hours a day, the engine may be started in the morning and operated until evening, then put into the garage until the next day, the only current drawn off from the battery is for ignition purposes and occasionally starting. You have noticed that the ammeter indicates anywhere from 5 to 15 amperes charging current. This means that if the battery has been fully charged, current is still driven through it and necessarily the plates are slowly but surely used up. The electrolyte, too, in this case is dissipated into the air. The specific gravity of the electrolyte at any time will indicate a full charge. In other words, your battery is just like a wooden pail kept full of water at all times. The pail soon is rotted away.

Rule for Long Battery Life.

To secure long life in a storage battery, the unit should be charged and discharged frequently. If you should find that you are overcharging your battery, turn the tail light on occasionally during the daytime or even when you leave the car at night. This will serve to drain the battery slightly and keep it in condition.

Always bear in mind that your battery can be likened to a wooden pail. If it is drained too much it will be like a pail left in the sun; it soon falls to pieces. If on the other hand, it is kept too full, like the pail it will rot. Try to secure the happy medium by filling and emptying it occasionally.

There is one more point which might be made, and which few autoists realize, and that is the value of a storage battery charging station. The storage battery man's duty is to keep your battery in condition. He is the man who can "pour the water out of the pail and fill it again." Every time you pay the storage battery man fifty cents, remember that it is an investment which pays big dividends.

Don't let your automobile have heart trouble.

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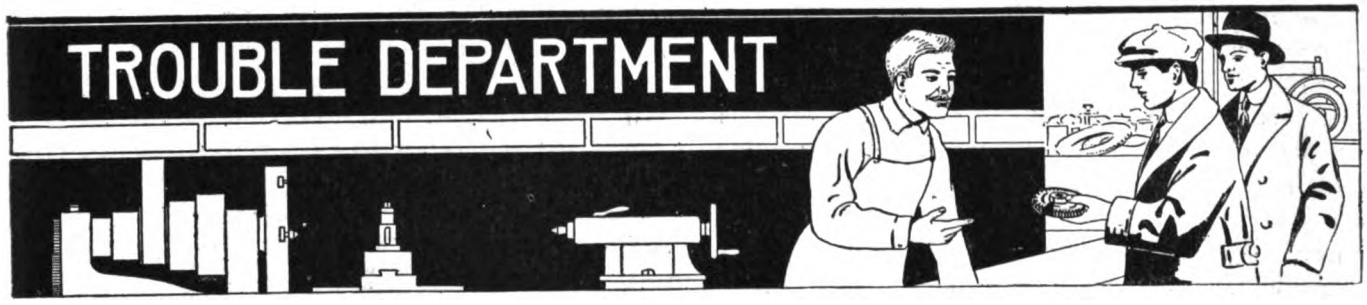
*President, Stewart Automobile School.

Are you teachable? Oh, I say, are you teachable? If you are not, then your wife and family and business associates deserve all the sympathy which all their friends can give them, for if there is anything that is nerve-wrecking, and happiness-destroying, and success-killing, it is to be continually associated with an individual who never learns by experience or observation or reading.

It is said that many people know as much when they are born as when they die, except for the few acquired arts of speech and locomotion. They simply are not teachable. You cannot tell them anything—they know it all. And the queer part of it is that it never dawns upon them that they are their own worst enemies. I pray you, whatever else your faults, BE teachable!



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Poor Differential Adjustment.

2470

From W. E. Touhil, New York.—I have a Studebaker 1913 car, Model 25, and have trouble in breaking or stripping the bevel gear pinion or ring gear, one or the other. I have never had them stripped but once on a hard pull. The stripping usually occurs just as I start, or when I am running along on high. Clutch works very nicely. Can you give me any cause for this, and is there any way to overcome same?

Reply.—Your trouble in stripping the gears was probably due to the fact that the pinion gear did not mesh deeply enough into the ring or master gear. Examine the adjustment of these two gears and see that the pinion gear teeth mesh into the master gear teeth almost their entire depth. They should not mesh so deeply as to cause a grind, but they should mesh deep enough so that there is little or no back lash.

To adjust this, bring the gears together with their backs in line. You can tell by the feeling whether the backs of the teeth come together. You can bring them still further together until the teeth of the pinion gear bottom against the space between the teeth of the ring gear. Then back each gear away from the other about 1/64 of an inch. Fit a handle to the pinion gear shaft and turn it by hand. Listen to the gears and if they grind, back them away from each other a very slight amount until the grind stops. If you are unable to stop the grind, it is because the gears do not fit each other properly or are worn out. The only thing you can do in a case of this sort is to replace both gears or else to let them grind until they are worn out. The two points to be careful about are, first, not to have any back lash, and second, not to allow the gears to mesh too deeply. Be sure that the pinion gear bearing fits the shaft tightly. There should be no side play in either this shaft or the differential. If this car is not fitted with differential and pinion adjustments, the gears may be adjusted by placing thin bronze or fibre washers between the gears and the housings.

Low Tension Magnetos.

2471

From Joe W. Cobie, Iowa.—In an Overland car, model 41, 1911, four cylinder, the differential seems to lock every revolution, if one wheel is jacked up and the other left standing on the ground. If I drive in the mud when the wheels slip, it seems as if every time the power changes from one wheel to the other, a sharp jerk occurs in the differential. Are there supposed to be blank teeth on the small bevel pinions?

Can a low tension magneto like the Remy or Splitdorf be used successfully on a low tension igniter on a stationary engine? Would it burn out the primary winding if the current could not get back to the magneto every time that the armature was cutting the most lines of force? Do the igniter points have to be closed when it is not igniting? I am referring to an engine that has been used with batteries. I want to make a small wooden pulley on the armature shaft and run it against the flywheel of the engine. Please let me know how to fix it, if it can be fixed successfully?

Reply.—Your trouble with the differential is probably caused by broken gear teeth in the differential housing. We would advise you to remove this unit, clean it out and replace such gears as have been broken. There should be no blank teeth on the gears. It is impossible to say whether the small bevel pinion gears are stripped or whether the differential gears on the axles are stripped. The only way to tell is by inspection.

It is hard to say whether a Remy or Splitdorf magneto would give satisfactory results when used with a low tension coil for make and break ignition work. There are a number of things to be considered. The main point is that the break between the points in the engine must occur at the point where the armature winding is cutting the most lines, else the spark will be very weak.

The next point is that the breaker points in the magneto itself would probably be burned away very quickly. You would have to arrange it so that these points separated at the same time as those in the engine. However, you might remove the breaker box entirely or remove the breaker points and wire directly from them to the engine through the low tension coil. We doubt if the magneto coils would be burned out because current would be generated only while the breaker points were together, and the machine will not generate any more current than is needed. The armature winding is heavy enough to stand considerable of an overload. In fact it will stand more than the magneto can generate. As a suggestion for the winding of this magneto, we would like to have you try the following:

Remove both breaker points in the magneto leaving the cam in place. Then connect the insulated portion of the

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breaker box with the low tension coil. Connect the other low tension coil terminal with the engine breaker mechanism through a switch. Be sure to ground the magneto on the engine. You will have to drive the magneto either by gears or by a sprocket in such a way that the breaker points in the engine separate just at the time when the armature winding is cutting the most lines on force. The spark will occur at the time when the ignition points separate and the points should be separated during that portion of the stroke in which the engine is not firing.

Starting on Reverse.

2472

From Harvey M. Wineberg, Pennsylvania.—I have been driving a few cars with three speeds ahead, and one reverse, and when I have stopped on a hill with a dead engine I was able to start the engine again by shifting in reverse gear and allowing the car to run backward a few feet, then letting in the clutch. The engine would then start on reverse. With a Ford car I have never been able to start the engine on reverse, backward down a hill. I have asked a few men that run Ford cars about this but could not get any information. I would like to know why the Ford engine will not start in reverse with the car running backward down a hill just the same as any engine in other automobiles, and would thank you very much for any information I can get on this question or on the Ford transmission.

Reply.—The reason why the engine cannot be started in this way is because of the fact that with the reverse ratio the momentum of the car is not great enough to turn over the engine. The power required to turn the rear wheels with the reverse gear engaged is a great many times larger than the power required to turn the engine over with the hand crank. If the hill were steep enough and the wheels do not break, the engine could be started. If you will notice some time when you throw in the low speed forward on a slight grade, the car will be stopped before the engine is started and the low speed forward gear ratio is considerably lower than the reverse gear ratio.

Faulty Ignition System.

2473

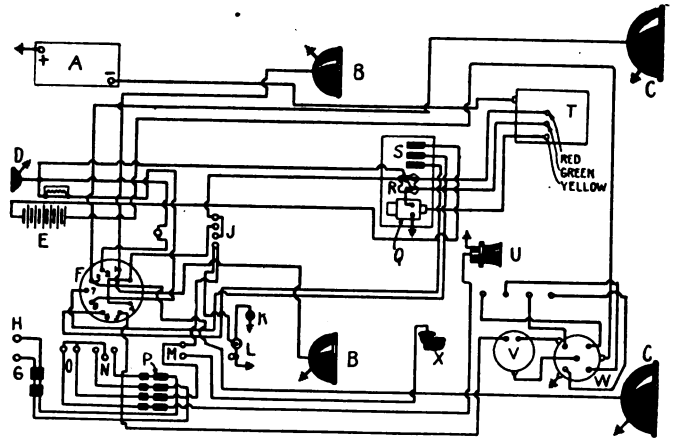
From Lorenzo French, Wyoming.—I have a 1914 Ford that is awfully hard to start. It is equipped with a Rayfield carburetor and I get good mileage. It pulls well after it is started and everything seems to be in good shape so far as I can see. What would you think is the matter with it? It has also a K W master vibrator, is wired for batteries too, but positively will not run on them. Why? Sometimes a little white smoke will come out of the breather pipe when the cap is taken off to put in oil. What does that suggest? Might it mean a broken or worn ring, and does it do any harm?

Reply.—We should advise you to examine the wiring of the car very carefully. Be sure that one side of the dry batteries are grounded to the frame and with the other side is connected with the proper terminal on the master vibrator. Be sure that the batteries give at least eight volts. The car is started easily upon batteries in warm weather. If you find that it does not, examine the carburetor float level and see that the gasoline level is not more than one-eighth of an inch below the needle valve outlet. If all the manifold joints, the valve stems, spark plugs and porcelains are tightly fitted and do not permit the passage of air through them, the engine will start easily. The reason for the smoke from the breather pipe is probably a leak in one of the pistons. It is hard to tell whether the cause is a broken ring or not. If the engine runs well and does not knock, we should advise you not to worry about the white smoke.

Cadillac Wiring Trouble.

2474

From E. G. Noth, New Jersey.—I have a 1914 Cadillac. The other morning in attempting to start the engine I found that the battery had run down. I had same recharged and in connecting it found that the armature of generator (Delco) started to revolve and continues to do so until I disconnect the battery, or wire to the generator commutator to the brush. Where is the trouble? The starter fails to turn the engine over. Is this due to the short circuit? Would it damage the generator to run it in this condition until arrival at a service station?



Wiring Diagram of 1914 Cadillac. Delco System. A, Battery; B, Side Lights; C, Head Lights; D, Tail Light; E, Dry Cells; F, Switch; G, H, Gear Shift Coils; J, Cut-Out; K, L, Hand and Gauge Lights; M, Horn Button; N, O, Gear Shift Buttons; P, Door Connections; Q, Regulator; R, Cut-Out; S, Ignition Relay; T, Motor-Generator; U, Horn; V, Coil; W, Distributor.

Reply.—Undoubtedly there is a short circuit in the wiring of your car, and we would suggest that you examine the wire leading from the ignition switch to the motor generator. We doubt if any damage will be done to the engine by driving same to the nearest service station.

What we think has happened is, that either through some fault of the ignition switch or because of grounded wire, the ignition line is turned on at all times when the batteries are connected. As soon as the generator commences to operate, an automatic switch inside prevents the current from running through it. A wiring diagram is given herewith and we would suggest that you compare it with the present wiring on your car.

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High Tension Magnetos.

2475

From J. H. Gittens, West Indies.—Will you be good enough to send some information, by return mail, to a far away subscriber who takes much interest in your publication, and looks forward to each new copy from which he gains very useful information?

Recently there has been in our garage two magnetos, each with the same trouble, one of these a Simms, and the other a Bosch. Both were four cylinder high tension. These magnetos gave a fair spark when the armatures were rotated, but when placed on the respective cars they run for only a few miles, stop, and pick up again.

We have put them through all the tests at our disposal and tried out the tests for a broken armature wire, as prescribed in one of the issues of the Auto Dealer and Repairer. We found a deflection on the ammeter from the interrupter point test but none from the collector ring test. The Simms magneto, however, after being put through the foregoing tests, seemed to get new life, and ran the car splendidly for two days afterwards, but is now just as bad as ever. Please tell us what is wrong and if we could remedy same, and by what means?

We also have a 12 volt dynamo, with which we want to charge storage batteries. Please let us know what horsepower motor, of 120 volt alternating current would be required, what would the of same be, and what regulating device we would require when charging 6 volt batteries?

Reply.—Your trouble in both cases is probably due to punctured insulation upon the secondary coil winding. Under the test it is very possible that the heat generated by the passage of current through the wire melts the insulation to a certain extent and for a time prevents the passage of a high tension current through the winding or to the base. However, as soon as enough current is generated in this winding, the spark under tension short circuits. The only remedy is to remove the high tension winding in both cases and replace it. Before doing this, however, we should advise you to test this winding very carefully with a telephone receiver and a very weak cell. If there is a break in the winding, you will get no current through it and it will be safe for you to replace the armature. Make sure that the secondary winding is connected with the collector ring.

The writer has in mind a Simms magneto which he repaired some time ago in which the secondary wire had broken away from the collector ring causing intermittent action.

In answer to your second question relative to the power required for operating a 12 volt dynamo. As you do not say what the output of the dynamo is in amperes, we cannot tell you, but can give you a formula for finding it yourself.

We will assume that the dynamo generates ten amperes, then at 12 volts it generates 12 times 10 or 120 watts. An electrical horsepower is approximately 746 watts, and you will find that to generate 120 watts it will require 120 divided by 746 watts or slightly over .16 horsepower. The only regulating device which you would need would be a generator cut-out, and if you paid proper attention to the machine while it was in operation you would not need even this. This device is so arranged that when the dynamo stops the cut-out breaks the circuit and prevents the batteries from discharging through the generator. A hand switch would answer the purpose if you were careful to throw the switch off before you stopped the generator. This device should not cost much more than ten dollars and you may find that you can remove one from an old automobile. Generators cost anywhere from ten dollars up to two or three hundred, and you should be able to obtain a two horsepower electric motor for about thirty-five dollars.

Main Bearing Trouble.

2476

From A. R. Frank, Nebraska.—Will you kindly tell me what is the common cause of a knock in Ford cars? It is a sort of a hammer knock and occurs when the engine is running idle at good rate of speed, when under heavy load, and when at high speed. After having installed over-sized pistons the car was run about 2,000 miles and again overhauled. The main bearings have been tightened, also the connecting rods, the carbon removed, valves adjusted, and the pistons are still tight. After having run about 20 miles the same knock could be heard, getting worse continually. The bearings were tightened up by an experienced mechanic. Do you think that the oil not feeding properly might be the cause?

Reply.—We doubt very much if your trouble is due to poor lubrication. In our opinion your trouble is caused either by a loose flywheel or wrongly adjusted main bearings. If the flywheel is loose on the shaft, the knock will be noticeable while the engine is running idle, but will not be noticeable in high speed when the car is going up a slight grade and the engine is "pulling."

If the knock grows worse while the engine is working hard, indications are that there is trouble in the main bearings. Are you sure that the main bearings are lined up properly? If one of them is out of line, the crankshaft will knock at every revolution. The knock will be very heavy and resemble a carbon knock. If the knock is sharp and metallic, make a careful examination of the connecting rod bearings. After new bearings have been installed, trouble frequently develops and the bearings must be tightened again. Sometimes it requires five or six hundred miles to work the bearings into place for they are not fitted very carefully in the first place.

If after following the above directions you still have trouble, advise us and we will write you again. Be sure to tell us just what you have done.

Don't be afraid to mix a little generosity with your economy. It will help hold your patrons. Nobody likes to do business with a tightwad.

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Maxwell Gear-Set Trouble.

2477

From Ray H. Weikel, Pennsylvania.—I have a 1917 Maxwell. I have had the second gear stripped and replaced it with a new one, but when I go up hill it will fly out. The gears all look all right. The only thing that might be the trouble with it is that the shaft isn't quite in the right place. How much valve clearance has a Maxwell car?

Reply.—We do not see how the gears may be placed wrongly upon the shafts and are pretty sure that your trouble is located in the gear shift levers. Remove the gear-set cover upon which is mounted the gear-change lever. You will notice that the gear shift yokes are attached to sliding shafts. These two sliding shafts are operated by the gear shift lever and each of the shafts have one or two grooves cut in their ends and into these grooves fit pins held in place by coil springs in the cover. When one of the shafts is pushed so as to mesh one of the speed gears, the spring pin drops into the groove so as to hold the shaft in place. Your trouble will be found at this point. The groove in the shaft may be worn round. The pin may be worn smooth or the spring may not be strong enough.

Regarding the valve clearance, the distance between the valve stem and the tappet should be adjusted so as to permit the insertion of a business card while the engine is cold. This distance varies from .003 to .005 of an inch when the engine is cold.

Excessive Vibration.

2478

From George H. Pike, Massachusetts.—Will you kindly help me by giving your opinion as to what would cause excessive vibration of mud guards and the entire front of my Ford car. This was overhauled in winter and only run about 300 miles since. Before it was overhauled everyone remarked how free from vibration it was when running idle, but now there is a decided vibration. Would faulty timing do it? It does not sound good when I get up to about 28 miles an hour, but a repair man says it is O. K.

Reply.—We doubt very much if your trouble is due to faulty timing. The timing of the engine should be in the order of 1-2-4-3 and if you connect the wires up any differently from this, the engine would not run on all four cylinders. Your trouble may be due to any one of a great number of reasons. We would suggest that you remove the engine from the car and go all over it again. Weigh each one of the piston and connecting rod assemblies. If one of the piston and connecting rod assemblies weighs a few ounces more than the rest, or if no two weigh the same, you must find some means for balancing up the various assemblies. Each assembly should weigh within a fraction of an ounce of the others, or the engine will vibrate.

The main bearings must be lined up properly. In replacing the pistons you may have more compression in one cylinder than any other. The flywheel must be centered up properly. If you have replaced any part of the transmission or left out one of the triple gears the engine will vibrate. In testing out the engine, proceed as follows:

Remove the engine and transmission unit complete from the car. Remove all of the pistons and connecting rods as well as the cylinder head. This will leave the crankshaft and the transmission assembly in place. Mount the engine upon your work bench and so arrange it that you can turn over the crankshaft very rapidly. You might arrange to turn it over by means of outside power. If the engine vibrates while it is being run in this way, remove the transmission unit, leaving the flywheel and crankshaft in place. Try the engine again. If it still vibrates your trouble is in the flywheel or the crankshaft. If it does not vibrate your trouble is in the transmission. If it does not vibrate while the transmission is in place and the connecting rods removed, we believe that your trouble will be found in the pistons and due to the fact that one or more of the pistons do not balance properly.

Gasoline and Tires.

2479

From Myron Roller, Ohio.—Does gasoline cause inner tubes to rot?

Reply.—Gasoline or oil will cause inner tubes to depreciate very rapidly. Either of these two liquids will rot rubber and cause as much depreciation as actual damage in many cases. Many tire manufacturers claim that the reason why tubes or tires do not give satisfaction at the present time or mileage is due entirely to the fact that gasoline or oil is brought into contact with the rubber while the car is standing in a garage.

A Peculiar Skip.

2480

From F. B. Konhaus, Pa.—I have a 1917 Ford that has been run for about a year. It has developed a miss and we cannot locate the trouble. I have had competent mechanics tear down the engine, clean, regrind and reseat valves, etc. We have tried all new plugs and all new dash coils, carburetor has been removed, cleaned and examined. In fact we have done everything we know of, tried different grades of gas, etc.

The trouble is not constant, as sometimes it runs fine for ten or fifteen miles, but most of the time it has, not a full miss, but just about a fourth of an entire miss. This, like all Ford engines, leaks lubricating oil in front cylinder. What is the cause of this and which is the best remedy, over-size piston, over-size piston rings or non-leak rings? Compression is good and equal on all cylinders. The car has not been run over three thousand

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miles. We have tried about everything we know to remedy it, and any information you may be able to give will be greatly appreciated.

Reply.—We should advise you to examine the timer, for usually intermittent engine action can be traced to timer trouble. In fact the only way to be sure that the trouble is not in the ignition system is to install a new timer and new ignition winding.

We know of no way to prevent the oil leakage in the first two cylinders of a Ford engine, unless you install over-size pistons and leakproof piston rings.

There is one experiment you may try, though we cannot vouch for its effectiveness. If your trouble is bad you may try changing the oiling system in the following manner. In the first place the Ford oiling system is different from anything else on the market. Oil is fed to the timing gears at the front of the engine through a tube from the flywheel, where the oil is pumped by centrifugal action into a funnel-like cup upon the end of the tube. All of the oil reaching the various splash pans must first pass to the front of the engine through this pipe. Our suggestion is that you bore small holes through this pipe over each connecting rod pan and fit a plug into the end of the pipe. Through this plug bore a small hole to supply the timing gears with oil. A little experiment will enable you to determine the size holes to use. In this way you will distribute the oil evenly to all of the splash pans. This is only an experiment, however, and we cannot vouch for it. It is a personal suggestion from the writer.

Removing Carbon from Studebaker.

2481

From James Ruis, Michigan.—What is the best and easiest way to get at, clean the carbon out, and grind the valves of a Studebaker 4, seven passenger car?

Reply.—First remove the secondary wires, then drain the radiator and remove the top water jacket manifold feed which is fastened to the top of the block by studs and nuts. With this removed you will be able to remove the plugs in the tops of the cylinders in which are mounted the water jacket manifold studs. Then remove the spark plug and priming cup valve covers, and you will have two holes in each cylinder through which to work for scraping out the carbon. The valves may be ground after stuffing a piece of cloth in the cylinders to prevent the grinding powder from reaching the cylinders.

Third Brush Regulation.

2482

From George F. Mims, South Carolina.—Will you please let me know if there is any way to increase the charging rate of the generator on my Overland 90 car? I use the car principally around town where starting is frequent, and the speed too slow to keep up proper generating power. Can any adjustment be made in the third brush, or is there anything I can do to give me slightly more current in the battery?

Reply.—The charging rate on any third brush regulated generator may be increased by adjusting the third brush in the direction of armature rotation. The charging rate may be decreased by moving the third brush in the direction opposite to the direction of rotation.

Connecting Rod Knock.

2483

From D. Fay Davis, Oregon.—I drive a 1918 Studebaker four, and in climbing a hill that is rather long there is a knock in one of the cylinders. It sounds as if it were in the piston of the third cylinder. I do not think it is in the crank. What would cause the knock? Changing the spark does not seem to help much. After running for about 20 minutes, should smoke come out of the breather pipe? The engine is getting oil all right. What kind of oil is best to put on a cone clutch?

Reply.—We are of the opinion that your trouble is due to a loose connecting rod or a loose wrist pin, and would advise you to inspect these two parts of the engine. Before doing this, however, clean out all of the carbon in the cylinders. The reason for smoke coming from the breather pipe may be one of two things. Either there is a leakage past the pistons, or more likely a certain amount of the oil is vaporized by contact with the hot pistons. If the engine is getting plenty of oil you need not worry about the smoke from the breather pipe. There is but one kind of oil suitable for a cone clutch. This is called "Neatsfoot Oil" and may be purchased at practically any drug store. After cleaning the leather fabric thoroughly with kerosene oil and a stiff brush, rub the Neatsfoot oil into the leather very thoroughly until the leather is soft. If the clutch is faced with Raybestos, multibestos or any of these types of fabrics, we would advise you to consult a service station before putting any oil on them.

E. M. F.-Adjustment.

2484

From R. J. Kefferly, Illinois.—I have an E. M. F. 30 car and have much trouble with the rear axle. At present there is an awful growl and howl. It is all right in first, second and reverse, but in the third speed it sounds as though the ring and pinion gear mesh too closely. This is not the case, however, as I have examined it thoroughly. Could it be possible that the clutch engages too far into the flywheel, as it is very hard to release? When I ease the clutch out a trifle it seems to help reduce the noise.

As it is now, the clutch when fully engaged is inside the outer rim of the flywheel at least ¼ to ⅜ of an inch. The bearings, ring gear and pinion all seem to be in good condition, but I am at a loss to account for this trouble. I have made adjustments on torsion rods as the rear axle

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would jerk forward upon starting the car. I had an idea that this would cause the axle to get out of line. It sounds as though when making a revolution in reaching one spot the ring gear causes the noise.

Reply.—We are of the opinion that the master gear or differential housing is out of line and we should advise you to inspect this part of the car again very carefully. It is very possible that the pinion gear bearing does not fit the shaft properly. Again it may be that there is too much side play in the differential. We do not think that your trouble is in the clutch. The correct way to test the differential is to remove the axle from the car and fit the pinion gear shaft with a handle by which you may turn the unit by hand. If the wheels are in place you can very easily adjust the differential to the point where it makes the least noise.

Ford Ignition System.

2485

From G. J. McQueen, Oregon.—I want to ask a question in regard to the Ford ignition system. A friend and I were talking over the different types of ignition and the "Hunk-a-tin" variety came up, and what really struck us was this: The magneto is an alternating generator. Is it not? And the coils are vibrating coils. Then why is it necessary to have the vibrating coils? Would not a non-vibrating coil do the stunt, or is there a reason for using the coil they do. We have asked several garage men or rather fellows who put in their time at such places and we have not found anyone who can give us any satisfactory answer. Can you give us any light on the subject? We are not electrical experts although we have a common working knowledge of gas engine ignition.

Reply.—It is very true that the current generated by the Ford magneto is alternating but the difference between the alternating current generated by the magneto and the ordinary alternating current such as we are accustomed to in lighting systems is considerable. As you doubtless know, the high tension secondary current is generated when magnetic lines of force are cut or interrupted. In other words, every time the current in the primary winding of a coil drops from maximum to minimum and increase to maximum again, secondary current is generated. This is the first fact to be considered. The second fact is that the passage of electrical current takes a certain amount of time.

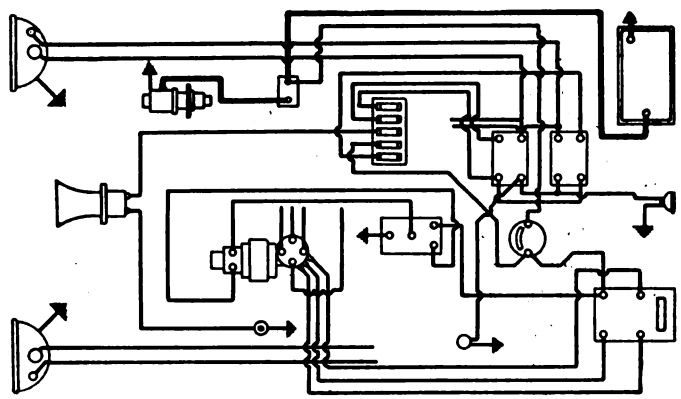
With these two facts in consideration, let us see what happens in an induction coil through the primary winding of which is being passed an alternating current. First, we will assume that the current alternates sixty times a minute, that is, that it is 60 cycle. There will then be sixty fluctuations in the secondary coil. Let us increase the fluctuations in the primary coil to 120. We will get as many fluctuations in the secondary coil, but the interval between the fluctuations will be only half as great as they were before. Suppose we increase the cycle up to 1,000 or more. The current will hardly have time to pass through the coil before it is changed to the opposite direction and the effect upon the secondary winding will be greatly retarded. One fluctuation will overlap the other and neutralize it to a certain extent so that the secondary spark will be very weak in comparison with what it would be were the primary current to be 60 cycle or less.

We have another fact to contend with and that is residual magnetism. Unless the iron is extremely soft, the core of the coil will resist such a rapid change in polarity. It may be said that alternating current of such high frequency as that produced by the Ford magneto has an effect upon an induction coil similar to that of direct current. This is why a vibrator is necessary.

Wiring of Allen Car.

2486

From L. F. Hardesby, New Mexico.—Will you give me through your next issue a wiring diagram for the



Wiring Diagram for Allen Model 37, 1916.

Allen car, Model 37, 1916, with a Westinghouse generator, two brushes and ignition unit combined?

Reply.—The wiring diagram of the Allen car is reproduced herewith.

The Meaning of A. L. A. M.

2487

From A. Kohler, Ohio.—What does A. L. A. M. mean in its different uses? It is used on dies, bolts, wrenches and also in rating motor cylinders. Please give the form of rating the horsepower of a given cylinder.

Reply.—These letters stand for "American License Automobile Manufacturers," and was a society consisting of various automobile manufacturers who were trying to standardize automobile parts. Their work has been continued by a later society called the "S. A. E." Society of Automotive Engineers. These societies have undertaken to standardize bolts, nuts, screws and automobile parts, and originated the horsepower formula

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used as a basis for finding the horsepower of gasoline engines. This horsepower formula is as follows:

Multiply the bore of the engine by itself and multiply this product by the number of cylinders. Then divide by 2.5. For instance, assume that a four-cylinder has a bore of three inches. To figure the horsepower of the engine, multiply the bore by itself, making 9. Multiply the 9 by 4 cylinders, making 36, and divide by 2.5, giving 14.4 horsepower.

Bosch Magneto Magnets.

2488

From W. E. Baker, Minn.—Will you kindly advise me, as one of your subscribers, how often, if at all, Bosch high-tension magneto magnets should be recharged?

Reply.—The magnets on this machine frequently last for many years and we can give you no rule for charging them. Unless the current from a storage battery is sent through the coils, the permanent magnets will retain their magnetism for three or four years at least.

Charging Battery from Generator.

2489

From O. C. Malmedal, North Dakota.—I have a 110 volt 9½ ampere compound wound direct current generator and would like to know how I could arrange it so I could charge a 6 volt storage battery.

Reply.—It would not be practical for you to charge one 6 volt storage battery from such a large generator unless you are able to regulate either the amperage or the voltage of the generator. If you can arrange to put in resistance between the generator and the storage battery cutting down the amperage to around four amperes you can charge the battery with it. The resistance, however, would use up considerable current and consume power, and as we said before, hardly advisable.

Testing a Cut-Out.

2490

From George Baum, New Mexico.—Will you kindly tell me how to test a cut-out, that is, how to determine the points where the device cuts out and cuts in? What size storage battery would you recommend for an automobile? What does the ignition relay do? Is the ignition relay the non-vibrating coil? What is the resistance wire for on an ignition coil or timer? What kind of a system is the Gray & Davis 1914 system? What system was used on the Chalmers Car? Is the Westinghouse single or double system? Will you decribe the Delco system?

Reply.—In order to test a cut-out, obtain a volt meter and start the engine. With the engine running at low speed touch the two terminals of the ammeter to the two generator wires leading to the cut-out and note the voltage reading. Have an assistant speed the engine gradually, until the volt meter shows six volts. Then note whether the cut-out closes at this point. The volt meter should not be left connected with the line but contact should be made at frequent intervals. If the engine is gradually speeding up, you will thus be able to note the voltage at which the cut-out makes the contact. In the same way you may find just when the cut-out breaks the contact. Should you desire to adjust the cut-out so that it makes the contact at 6.2 volts, run the engine at the speed at which the volt meter shows 6.2 volts and adjust the cut-out accordingly.

The size storage battery to be used for starting, lighting and ignition depends entirely upon the other units of the car. As a general rule the manufacturers are tending to adopt the six-volt three-cell storage battery, but as we said before, if the starting motor, the generator, or the ignition unit happen to be designed for 12-volt current, you will be obliged to use 12-volt battery. We cannot answer your question relative to the ignition relay, for we do not know what system you were using on your car. This device is designed to break the battery connections when the switch is placed upon the mag connections to prevent battery discharge.

In different systems this device is arranged differently and we can give you no more specific information. The non-vibrating coil is not the ignition relay, however.

The resistance wire on the ignition coil is designed to prevent excessive discharge through the coil should ignition switch be left upon the "on" position. As soon as you throw the ignition switch on, the resistance coil begins to heat and as it heats less current passes through it. If you should leave the ignition switch on over night, the coil would heat nearly red hot and prevent the passage of too much current. While the engine is running, contact is broken very frequently by the interrupter points and so the coil will not heat.

The Gray & Davis 1914 system would be termed a two-unit starting and lighting system. Upon the Chalmers car were used the following systems:

1914 Entz single unit.
1915 Entz single unit.
1915 Gray & Davis two unit.
1916 Entz single unit.
1916 Gray & Davis two unit.
1917 Westinghouse two unit.
1918 Westinghouse two unit.

The Westinghouse system may be either single or double unit.

There have been a great number of Delco type machines made. In every case the armature was of the shuttle wound type. In the case of the generator, but one winding was provided the armature. In the case of the single unit system, where the generator and motor formed one unit, the armature was provided with two windings as well as two commutators. One set of wind-

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ings was connected in series for starting, while the other set of windings was connected in parallel or shunt, as you term it, for generating. In some types of Delco apparatus but a single field coil was used, while in other types two field windings were necessary. We feel safe in saying that practically every type of motor or generator has at some time been represented in the Delco apparatus. A complete description of Delco apparatus and the various types and windings would fill a rather large book, and we should advise you to obtain a good electrical book from the library or purchase Dyke's Automobile Encylopedia.

Some Light on the Electric Problem

A Little Story About Headlights, Amount of Current Consumed, and How the Combination Affects Business

BY WARREN S. WILLIAMS

THE noise that proceeded from the productive part of Hickey's Repair Shop indicated that business was in a fairly flourishing condition, even if there was nothing particularly suggestive of activity in the attitude of Hickey, the proprietor, who sat in his economy-sized office with his long legs stretched almost clear across it and his eyes fixed on the ceiling.

Hickey was vastly busy, however. He was too busy to care whether he looked the part or not, and that's one of the signs of genuine busyness. He was working himself into the proper mental attitude for writing a letter to a customer who wanted a whole lot of adjusting —downward, of course—done on his last month's bill, and he was going over the whole matter with reverse English. That is to say, Hickey was putting himself in the shoes of the customer and talking the thing over amicably with Hickey.

Gradually the somewhat tense expression of his rather grimy visage relaxed and he swung around, his chair—*the* chair—squealing dismally, and attacked the little model 1908 or thereabouts typewriter upon which the correspondence of the establishment was executed. Hickey was a one-finger-on-each-hand performer on the typewriter, but as the correspondence was not heavy, the 1908 machine and his two good forefingers were equal to the job.

Hickey had finished the letter, read and re-read it and appended a big signature and dropped the document into his pocket for mailing at lunch time when the street door opened and closed behind Bob Smith, of Smith Brothers, who sold the Speedix.

"'Lo, Hick. What's doing?" inquired the newcomer, briskly.

"Same as usual," grunted Hickey, scrunching his tummy against the desk to let Smith get by and occupy the box which served as a seat when there were two in the office. "How's things by you?"

"Middlin' only. Say, do a job for me, rush, quick, right away?"

"Guess so, if it ain't too darn big. What is it?"

(Smith Brothers had no repair shop, and they found Hickey's honest shop, which was just around the corner, exceedingly handy; Hickey treated 'em right.)

"Well——" Smith hesitated a little. "I sold a car to a guy a couple of weeks ago and he's had a little trouble that isn't altogether his fault, and I'm inclined to stretch a point and fix it up for him."

"Stretch a point, eh?" echoed Hickey, pricking up his ears. "What kind of trouble did he have that wasn't altogether his fault?"

"Lubrication went on the bum and he burned out a bearing. I don't blame him much because I told him the car was all right just as it came from the factory and he'd better not touch anything—or rather it was Billy that told him—and it seems the oil didn't feed fast enough——"

Hickey interrupted by projecting a No. 1 size forefinger in the direction of Smith's nose.

"'Nuff said. I've got you, bo!" he exclaimed, chuckling. "You're still harping on that 'knowledge is dangerous' notion and the darned harp has busted a string. Ain't that right?"

"Hick, you know just as well as I do, if you'd own up, that if you try to stuff a salesman full of technical information he'll think he's an engineer, and he won't sell cars like he'd ought to. I believe a salesman ought to sell cars, and that's enough for him. Even if he knew it all he'd get our owners all tangled up, and they'd blame us instead of blaming themselves for misapplying what might be perfectly good dope. I'm no engineer myself, and I don't want to be, and I don't want my salesmen to get the engineering bug. What's the use, when here's Hickey's little shop almost next door——"

"All bunk!" commented Hickey, contemptuously. "Nobody wants you to have high-brow engineers selling cars; there's such a thing as a happy medium, ain't there? I know just as well as you do, if you'd only own up"—Hickey grinned at the plagiarism—"that about every time anyone asks one of your men something about the insides of his car he gets next to nothing. Then I get 'em and get credit for knowing something, but there's darned skinny pickins answering questions over the telephone."

"I wouldn't put it just that way"—hesitated Smith.

"Put it any way you like," Hickey butted in. "The fact is that you don't know anything much about the in-

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sides of a car and you don't believe in letting your salesmen tell anything even if they do know it, which they don't. When a man asks you people a perfectly reasonable question he gets a perfectly useless answer. I used to think I'd give up trying to argue with you, Smitty, but, darn it all, old man, you're overlooking chance after chance of making yourself solid with your owners and your prospects, only you won't see it that way."

Smith grinned.

"What's put it into your head that it's worth while to take another shot at saving me?" he inquired.

Hickey hesitated a moment.

"If I tell you," he said, "You've got to agree to keep everything connected with a certain incident strictly under your hat. I don't want it mentioned to the parties concerned, and if I tell you it'll be for the purpose of getting your goat on the principles involved, and nothing else. Is it a go?"

"Fine!" cried Smith. "Deep, dark and mysterious. Yes, yes. Go on. Your story interests me strangely. I agree to the conditions."

"Quit your kiddin'," said Hickey "You know those four 1914 Speedix Specials you're trying to get off your hands?"

"Rather!" said Smith, ruefully.

"A man called up your place the other day and said he liked the looks of the car, considering the price, and wanted to know what was the matter with it besides being an old model and tired of standing round in stock. Your man told him the main thing was that there was no electric equipment. So the guy says that suited him because he had a little shop of his own and he'd like nothing better than to put on his own starting-lighting outfit, if it could be done. 'Could it be done?' he says.

"Your man took a desperate chance and told him 'Sure it can be done.' Then the prospect, encouraged by your man's confident tone, wanted to know how much current a set of lamps would take, and how he could figure what the generator output ought to be, and stuff of that sort. He was one of those mechanical nuts, and he wanted to monkey with the car for fun—but the main thing was that he wanted to buy it first."

"Hm," said Smith, sternly eyeing the toes of his shoes. "What did they tell him?"

"The Lord only knows," replied Hickey. "All *I* know is that your man, seeing a sale balancing on the edge, yelled 'Wait a minute, and made a big rustling of papers and finally reeled off a string of figures that the prospect took down very carefully and took away with him. And he proceeded to try to make those figures work."

"Was it Billy that gave him that stuff or was it——"

"Hold on, hold on!" cried Hickey, with both hands in the air. "As soon as you get out of here you've got to officially forget every word of this or I won't tell you the rest—which is the real meat of the story."

"Oh, all right." And Smith resigned himself.

"Well, as I say, the nut tried to make the figures work, and that's what led to his getting in touch with me." And Hickey, complacent, paused to apply a match to the last 125 millimeters of what had been a cigar.

"O ho!" ejaculated Smith. "I thought there'd be something like——"

"Shut up!" ordered Hickey. "Applying your man's figures, the nut calculated that it would take an average of a little less than one horsepower for every lamp on the car, and he didn't like the idea of putting such a burden on the little Speedix motor. He was looking at that little old Terrier roadster I've been trying to sell and he thought it might suit him because it has more motor than your wagon. He told me what he was doing and asked me the same questions about the electrical stuff. I gave him the dope—the real stuff—and he figured it out on the spot, easy. He couldn't make the results jibe with the results he got from the other 'dawtah' as he called it, so I told him which was right and which was wrong. To make a long story short, he went away happy."

"Mind telling me who the nut was?"

"Nope," grinned Hickey. "Elihu Wesley Pragg, 773 Maple Avenue."

"Pragg!" echoed Smith. "No one can sell *him* a car!"

"Maybe not; but he's showed signs of being able to sell himself one."

Meditative silence for the space of sixty seconds.

"What's your way of figuring that stuff?" inquired Smith. There was a suspicion of sheepishness in his grin.

"You can figure," replied Hickey, calmly. "On a current consumption of one watt for each candlepower in headlight bulbs, and one and a quarter watts for each candlepower in the little bulbs in the side and tail lights and such. That is, a 16-candlepower bulb will take 16 watts and a 4-candlepower side light will take 5 watts."

"Easy! Easy!" muttered Smith, scribbling.

"All right." Hickey dropped to a lower gear. "If you want to know how much power the whole bunch of lamps will pull from the generator or the battery all you have to do is to add up the wattage of all the lamps. If you have two 16-candlepower headlights, two 4-candlepower side lights, a 4-candlepower tail light and a 3-candlepower instrument board light you'll have two sixteens—that's 32—three fives, which makes it 47, and the dash lamp which takes 3¼ watts—call it four to make an even number and you've got a total of 51 watts."

"Got it," said Smith.

"Well, 746 watts is the electrical equivalent of a horsepower, so you can see where Pragg sat up and took notice and felt better."

"Holy smoke!" exclaimed Smith. "Then the figures my man gave him must have made him calculate that the lamps would draw about—hm, hm, let's see—about—more than three thousand watts!"

"There or thereabouts," grinned Hickey. "That's enough current to drive an electric delivery wagon on a good road with a fair load."

Smith groaned.

"Suppose," he pursued, "You know how much current

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you can get out of your generator, and all that, how can you tell what lamps to use?"

"You've got to know the voltage of your generator current. The lamps must be of the same voltage and the total wattage of the lamps must be not more than the capacity of the generator; ought to be a little less."

"But you've been talking watts," said Smith. "What d' ye mean, volts?"

"Volts is like pressure," instructed Hickey. "And amperes means something like quantity. You'll generally find generators marked with voltage and amperage. Multiply the two together and you get the watts, which is the amount of work the volts and amperes between them can do. And if you know the voltage of your lamps, which you can find out by looking at them, and if you know their total wattage, which I've instructed you how to find, you can tell the current consumption of each lamp if you want to. Do you want to?"

"Shoot!" said Smith.

"Multiply the watts per candlepower by the candlepower of the lamp and divide by the voltage and it's done."

"Much obliged, Hickey," said Smith, pocketing his notebook. "Though I don't know that you've made much impression on my principles. What did you say Pragg's address was?"

Without batting an eye Hickey dove into a pigeonhole.

"Here you are," he said, "773 Maple——"

"Good Lord, what's that—a check?" Smith's eyes were glued to a slip of pinkish paper pinned to the letter Hickey had produced.

"Oh, sure," said Hickey, calmly. "Didn't think I'd let him get away, did you? He bought that Terrier roadster, you know."

NEW AND INTERESTING THINGS IN MOTORDOM

Comer Auto Stop Signal.

This is an automatic safety device which is operated by the brake rod. In this issue of our magazine readers will find a full page in two colors describing and clearly illustrating this device which is an exceedingly clever and convenient one. If your dealer does not handle the Comer Auto Supply Signal send your order direct to the manufacturers, The Wonder Sales Company, 616-617 Hippodrome Bldg., Cleveland, Ohio, and dealers should write to this Company for their special dealers' proposition.

Flag Holders and Flag Staffs.

Every automobile owner today should show the national emblem on the front of his car, but he should be careful not to tie the flag in such a way that it can fall over or drop upon the ground. If he is not careful he may damage the front of the radiator, and so he should purchase a specially constructed flagholder which may be clamped upon the filler cap.

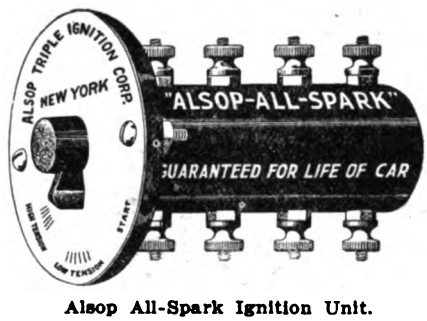
Such a device is manufactured by the H. K. Metal Products Co., 60 Grand Street, New York City. The holders made by this firm may be obtained in a great number of styles and sizes. The so-called "Liberty Line" of flagholders is very complete and may be obtained for carrying as many as seven flags at one time or for attachment inside the car, as they may be attached to any flat surface with two wood screws.

"Alsop-All-Spark."

This article is one of particular interest in these war times when economy is the by-word. It is a saving because by its use, action is immediate and permanent, and it is guaranteed to utilize the old, dead carbon choked spark plugs with as satisfactory results as can be obtained from new ones without this device. The advantage of the Alsop-All-Spark goes much further than the saving of spark plugs, as the reinforced spark is a more positive exploder of the gasoline.

When it is considered that there are as many as 5,400 sparks per minute in the average six cylinder engine which runs 3600 R. P. M. and that only a certain per cent explode the charge, it can be seen readily that a device which gives such a powerful spark that it will penetrate through heavy oil and spark dead carbonized plugs, will certainly cause a great deal more powerful explosion per spark delivered. In actual test an increase of 30% in gasoline mileage will show with its attachment.

In an official Government test by the war department a Ford car was filled with ten quarts of oil above the prescribed high level and with this oil it



Alsop All-Spark Ignition Unit.

could not be run more than fifteen minutes. An Alsop-All-Spark was attached to the same car, when all the plugs were dead, and the engine started off perfectly and was run for five hours despite the ten quarts surplus oil. At the end of the test the plugs were removed and found to be white and clean, as good as new, though the car would not have run fifteen miutes without the device.

It will never be necessary to change spark plugs on trips again as a slight turn of the dial on the dashboard will raise the voltage to such an extent that it will overcome any misfire, no matter what condition the plugs may be in.

Owners of cars who have trouble with oily cylinders, caused by loose piston rings or scored cylinders, will find this device will explode the gas in such form that the oil will not give any trouble and a $100 repair job can often be saved. This article screws on the dashboard, is controlled by a dial on the inside of the car and is connected between the spark plugs and distributor. It does not interfere in any way with the present equipment and is guaranteed to work equally well with any ignition system.

Dead Easy Tire Pump.

The Globe Manufacturing Company of Battle Creek, Michigan, manufacture a product termed the Dead Easy Tire Pump, which should be investigated by every car owner who desires an efficient tire pump. The Company makes a free trial offer and requests those interested to write for the pump for fifteen-day trial.

Indoor Ice Carnival Opens At Hotel Winton.

Although opened but a few months, Cleveland's newest hotel, the Winton, has already established itself as one of the most popular and complete in the country.

With its 600 rooms, all outside and each with bath, every appointment for the comfort and convenience of the guest is provided.

The ballroom which accommodates 1,000 persons comfortably is one of the most artistic in the country.

Of its restaurants, the Winton Rainbow room, with seating capacity for 1,000 people, has proved an enjoyable surprise to visitors. The novel arrangement of two large terraces which provides a clear view of the stage, unobstructed by posts, is most effective during the Ice Carnival, now in progress.

Ever alert for refined, enjoyable entertainment, the management has installed a skating platform of real ice. None but the most talented artists have been engaged, and those who have read or heard of Norval Baptie, the world's champion ice skater, will welcome this

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opportunity to see him and his graceful partner, Gladys Lamb, in the Winton Rainbow room. The ease and grace with which they perform seemingly impossible feats on skates, is both startling and enjoyable to the audience.

Another artist who has been pleasing the country and is now at the Rainbow room, is Romayne. A niece of Billie Burke, Romayne learned her art of Charlotte and bids fair to succeed her teacher as the world's greatest ice skater.

Further diversion is furnished by Loos Brothers, excellent singers, who please with tuneful songs while whirling about on their skates.

A novelty is provided by St. Pierre, a grotesque comedian, whose antics never fail to create laughter. Smith and Russo, two charming young girls, add further enjoyment to a most pleasing performance.

Paul Biese and his novelty orchestra, who for five years was the attraction at Chicago's famous College Inn, is now at the Rainbow room, where his music is an added attraction of this popular restaurant; Biese and his orchestra play both noon and evening.

Visitors to Cleveland will find the Hotel Winton a most delightful "home" and the Rainbow room a most attractive atmosphere of refinement and enjoyment.

The Stenman Electric Valve Grinder.

We are illustrating a new model electric valve grinder which has just been brought out by the Stenman Electric Valve Grinder Co., 42 Southbridge Street, Worcester, Mass. This model has many improvements which the earlier models do not have. Among these improvements are the following: A large handle giving a better grip and balance, switch in the handle at the finger tips giving perfect control, flexible steel conduit for connection wires, galvanized and insulated, impervious to oil and water, will not break or crack like ordinary cable, similar to that used on speedometers,

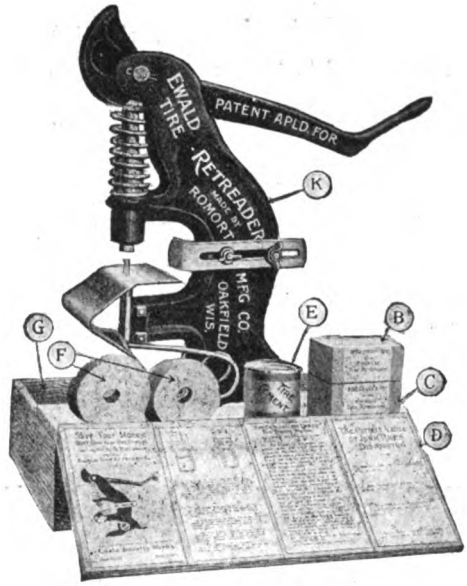


Stenman Electric Valve Grinder.

though lighter; separable attachable plugs of a special composition, detachable both at the handle and socket; all gears made extra heavy of phosphor bronze. This valve grinder meets all requirements and is strictly up to the times. No doubt many repair men who read this magazine will desire to equip with one of these grinders.

Ewald Tire Retreader Outfit.

The Government is requisitioning a large percentage of the rubber and it devolves upon the repair man to save all the tires that he can. In fact the car owner himself should investigate the Ewald Tire Retreader outfit which is be-



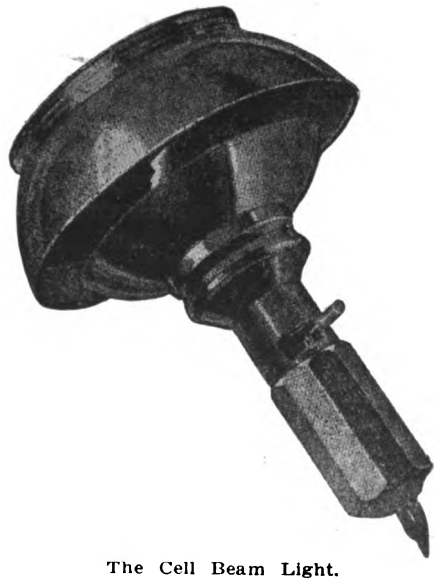
Ewald Tire Retreader Outfit.

ing sold by The Zinke Co. of Chicago, Ill.

This device consists of a retreading machine together with staples, cement, rubber reliners and full directions for use. The machine is so arranged that a new tread may be fastened directly over the old shoe. In this way the car owner is able to use old shoes that are almost ready for the scrap heap.

The Cell Beam Light.

We doubt if there is on the market at the present time another light of more interest than that manufacured by the Cell-Beam Mfg. Co., 1101 Bedford Ave., Brooklyn, N. Y. This device may well be said to have a thousand uses.



The Cell Beam Light.

It is a combination device and may be used as a search light, a spot light, or a trouble light. The light itself weighs less than a pound and may be clamped upon the car in any convenient position. When not in use it may be slipped into the side door pocket of the car.

The globe itself is surrounded by a specially arranged reflector which is designed to prevent the direct beams of light from projecting into the eyes of an approaching driver. At the same time, however, it diffuses a certain amount of light to render driving possible. It is finished in polished nickel and furnished with a high grade switch in the handle, together with eight feet of flexible cord and a 30 candle power mazda nitrogen bulb. The manufacturers have resumed the marketing of their product direct from the factory through the jobbing trade.

Another Vesta Improvement.

In our articles devoted to the storage battery in the past two or three issues, we have shown our readers that the capacity of a battery is proportionate to its plate area and in this issue we are calling the readers' attention to the fact that a plate depreciates in proportion to the amount of active material thrown to the bottom of the cell.

The Vesta Accumulator Co. of Indiana Ave., Chicago, Ill., announce that they have recently produced a porous hard plate to which they have given the trade name of "Poro-hard." By increasing the porosity of the plate more of the active material is brought in contact with the acid electrolyte. The result is equivalent to increasing area, for the active area is increased by the extreme porosity. While being exceedingly porous this new plate is not soft and spongy, so that it still has sufficient tensile strength to resist the electrolytic action and the manufacturers claim that it will have a longer life than the average plate.

Stevens "Wartime Economy" Catalog.

At a time when the motorist and dealer are squaring up their purchases with wartime economy—avoiding frills and adhering strictly to accessories that make for increased efficiency and comfort in motoring—a catalog like that now being issued by the house of Stevens & Company, 375 Broadway, is of unusual merit and timely interest.

More than two hundred motor necessities are interestingly described in the new Stevens book which is replete with bright and informative illustrations. There are sixty-four pages devoted entirely to Stevens Products and among these, accessories for Fords are prominently displayed. A copy of this new catalog will be mailed to any dealer on request.

Tires At Low Prices.

The Service Auto Equipment Co., 951 Traders Bldg., Kansas City, Mo., is offering tires at low prices. They say that these tires are guaranteed for 6.000 miles with no seconds. A full line is carried of all sizes, non-skid or plain, and these tires are shipped prepaid on approval.

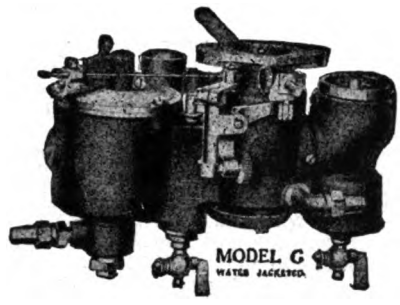
Trade Announcement.

When the General Tire & Rubber Company of Akron offered to the repairmen their latest type of quick repair patch for any make of cord tire, they had developed an entirely new type of patch.

The vulcanizer generally has been im-

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ECONOMICAL



EFFICIENT

The Rayfield Carburetor has met every demand of the hour. The war has doubly accentuated its sturdy dependability.

The World's Best

The Rayfield earned its title because it

SAVES MORE GASOLINE
DEVELOPS GREATER POWER
DELIVERS MORE SPEED
GIVES MORE FLEXIBILITY

Rayfield made good because it is right in principle and right in mechanical workmanship, and because each model is at all points time-tested and tried—the public is never asked to experiment with an unknown quality in Rayfield.

The Carburetor which has stood the test of years is the one to which car owners now are turning for elimination of fuel waste and dependability in carburetor performance.

Order from any Rayfield Distributor, Jobber or Service Station, located everywhere.

Findeisen & Kropf Mfg. Co., 21st & Rockwell Sts., Chicago

RAYFIELD CARBURETORS

Please Mention the Automobile Dealer and Repairer when writing to advertisers.

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pressed during the last year with the necessity of handling cord tire repairs in a more advanced manner. Experimental work conducted by the General Tire Company developed this new type of patch made up with a special cord fabric thoroughly impregnated and cemented on the back surface with a cold patch cement.

Many of the vulcanizers have not yet secured sectional moulds which are large enough to handle six, seven or eight-inch cord tires now in use. They naturally appreciate the ease with which a reliable and substantial cord tire repair can be made by using Multi Cord Patches. These Multi Cord Patches are being furnished, one size for 3½-4-in. Cord Tire; one size for 5-6-in. Cord Tire, and a larger size for the 7-8-in. Cord Tire.

Counter Display For Raybestos.

We are illustrating a new counter display card which has been brought out by the Raybestos Co., of Bridgeport, Conn., to assist dealers in advertising Raybestos brake linings. One of these counter displays is packed in each carton of 20 boxes of genuine raybestos without wire, for Ford cars, but of course any dealer who is now purchasing or has purchased a quantity of this product from his jobber will obtain the rest of his articles to be supplied with a counter display free of charge. All inquiries should be addressed to the Raybestos Co., Bridgeport, Conn.



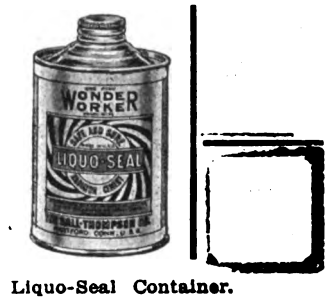
Raybestos Counter Display.

Kerosene Equipment For Fords.

The use of kerosene as a motor fuel is a live subject in which the public is keenly interested, especially at this time when gasoline is likely to be highest on account of Government taxation and from other causes. The Kerosene Equipment Company, Detroit, Michigan, manufactures a special kerosene vaporizer all ready to be attached to the engine of your Ford car. While gasoline is used in starting the car, even with this device, it is only for a very short period, just long enough to raise the temperature of the kerosene to a point that will properly vaporize it and hold it in suspension. To insure a perfect mixture a four notch adjustment is provided to satisfy conditions on engine and local climatic conditions. Those who have installed this apparatus are enthusiastic over the results obtained and readers who are interested should write direct to the Kerosene Equipment Company at Detroit, Michigan, for an illustrated circular, prices, and full particulars.

Liquo-Seal.

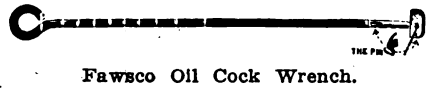
Nothing causes the motorist more annoyance than a leaky radiator, and the repair of this member often costs considerable, because of its peculiar construction. Liquo-Seal is a chemical composition which may be put into the radiating system and should leaks develop, the seal compound fills them. Upon contact with the air Liquo-Seal turns into a hard cement. The manufacturers, The Hall-Thompson Co., of Hartford, Conn., claim that this product will not clog up even the finest honey-comb radiators.



Liquo-Seal Container.

Oil Cock Wrench.

"The extension arm," as it well might be termed, is sold by J. H. Faw, Inc., 37 Warren St., New York City. The manufacturers term this device "the oil cock wrench" and gasoline gauge. As a matter of fact this device should be in the hands of every car owner for the very reason that it obviates the necessity of crawling underneath the car and soiling the clothes in order to find the height of oil in the Ford crank case. "The oil cock wrench" is used for opening the oil case cap on the Ford crank case and is fitted with a pin which may be used for cleaning out the various passages. All of this may be done without soiling the hands or the clothes. It is surely worth the money.



Fawsco Oil Cock Wrench.

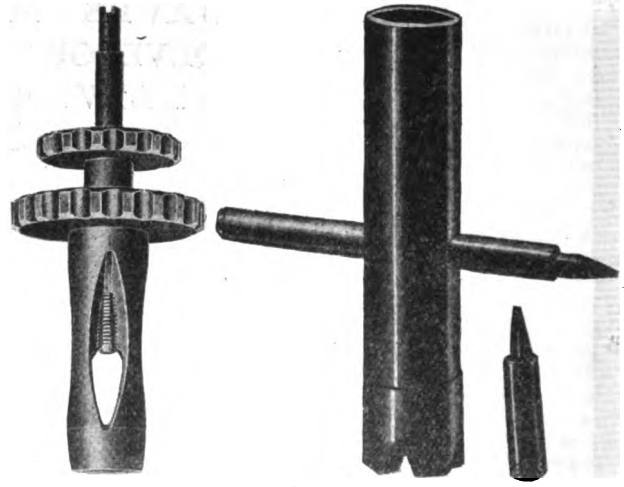
A. & H. Tire Valve Tools Keep Valves Good.

Everyone in the automobile industry, whether connected with the branches that have to do with the cars themselves or with those which have to do with the thousand and one things that are collectively called accessories, is doing his part toward making the use of the car free from trouble and annoyance.

Most of the big troubles have been wiped out, and, for that matter, so have most of the little bothers, which latter class may be said to include tire valve annoyances, which are being vigorously pursued by the A. & H. Manufacturing Co., Inc., 505-507 West 45th Street, New York. This company manufactures the A. & H. True Threader valve tool, and to this it has now added the A. & H. Repair tool; between the two, it is stated, every trouble of a tire valve can be taken care of as long as the valve is in a condition to be made serviceable.

The True Threader is, as its name indicates, a thread-cutting tool of convenient size—a little more than 3 inches long—with which the smaller threads of a valve can be put into good condition. It has dies for threading the inside plunger and the outside nipple, and at one end is the fork required for removing plungers.

The new valve repair tool takes up the work where the True Threader leaves off. It is a little larger, for it will do the larger work on the valve; the length is about 4¼ inches and a T-handle makes it convenient to use. It will recut the large outside stem thread, remove the hexagon nuts, remove broken plungers and will ream rough nipples.



Two A & H Valve Tools

New Device Stops Gas Tank Waste.

Gasoline economy has never been so imperative as today, and with the recent announcement by the government of the tax to be levied on gasoline, every automobile owner is especially interested in its conservation.

Perhaps the greatest waste of gasoline has been the one least known—that which evaporates or is jolted through the vent hole of the gasoline tank. Conclusive tests at the Armour Institute of Technology and the Associated Engineering Laboratories have proved that this waste of gasoline can be stopped by equipping your car with an Imperial Gas Tank Seal. It works equally well with gravity or vacuum systems and is so simple it cannot get out of order. The valve admits air automatically, to replace gasoline through the carburetor. The Seal is easily installed in a few minutes—simply bore a ⅜-inch hole in the filler cap.

Fuel bills can be reduced from $12 to

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Stop that squeak
with
CORK INSERT BRAKE LINING
FOR ALL CARS OTHER THAN FORDS

SQUEAKING brakes are a nuisance. Car owners detest them. The public hates them. It's a sign of inefficiency, too, and a danger signal. Means hard, slippery linings—linings that may fail to hold in the emergency.

There's no longer any excuse for squeaking brakes. Cork Insert Brake Lining ***absolutely prevents squeak.*** It never gets hard or slippery. It produces smooth, positive braking action to the last mile of use.

Cork Insert Brake Lining also is grab and slip proof—***oil*** and ***grease proof.***

It gives ***sure*** control of the brakes and ***longer wear.***

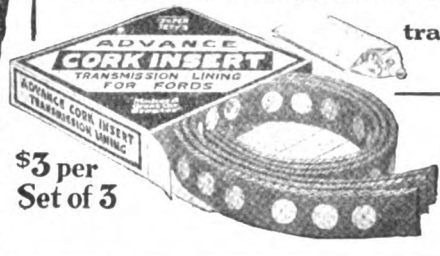
Every time you hear a squeaking brake think of Cork Insert — ***it stops the squeak.***

Practically all jobbers handle Cork Insert—most garagemen and dealers in accessories sell it.

Advance Automobile Accessories Corporation
Dept. H-5, 56 E. Randolph St., Chicago, Ill.

The Two Cork Insert Winners For Fords

Stops the grab, slip, chatter in Ford transmission



$3 per Set of 3

Keeps the Ford fan fanning and the engine cool



$1
For 1917-18 Fords
85c for all earlier models

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$40 a year and mileage increased by equipping a car with the Imperial Gas Tank Seal. This device is the only one



Imperial Gas Tank Seal.

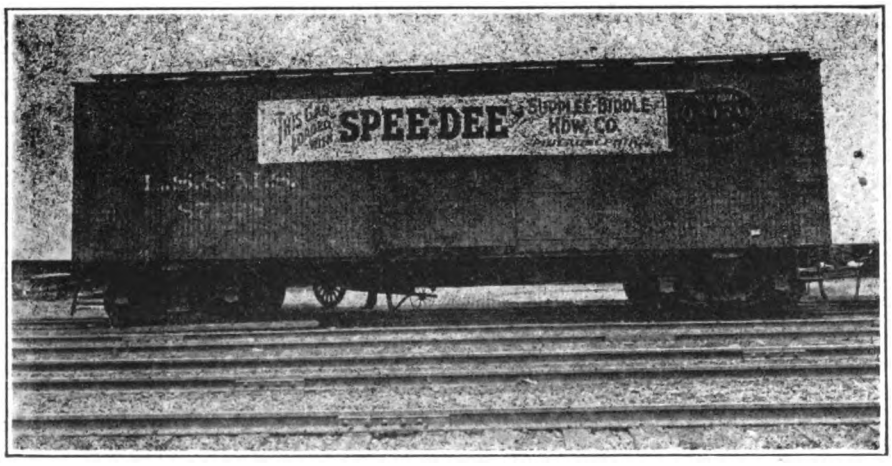
of its kind on the market, is made by the Imperial Brass Manufacturing Company, 1200 West Harrison Street, Chicago.

With or Without Water.

Any of our readers, who are not already familiar with Spee-Dee Cleanser, should get posted at once. This compound, which cleans dirty, greasy, grimy hands, with or without water, washes automobiles, trucks and vehicles, has been justly named the wonder of the age by users everywhere

Spee-Dee is needed by every motorist, every mechanic and every housewife throughout the land as it is said to clean everything and injure nothing. It is gritless, harmless and pleasant to use. Dealers testify that this necessity is a big seller, in fact one dealer states that he considers this the best selling auto-specialty on the market. One small town dealer in Illinois sold over five cases in one week. Remember, Spee-Dee is not a soap, not a powder and not a liquid, but is a speedy cleanser which does the work.

The confidence of the trade in the merits of Spee-Dee is shown by the above photograph showing a carload of Spee-Dee shipped to Supplee-Biddle Hdwe. Co., Philadelphia, Pa., one of the largest and most energetic hardware jobbers in the East. You can purchase Spee-Dee from your jobber. The manufacturers, the States Chemical Co., 616 West Austin Avenue, Chicago, say they will send dealers selling helps upon request.



A Large Carload of Spee-Dee.

Electric Steam Vulcanizer.

The Consolidated Products Co., 1838 Central Avenue, Cleveland, Ohio, Department 12, are putting on the market a vulcanizer which is attracting considerable attention among garage men and jobbers. This machine is operated by steam, steam pressure being generated by electrical current. The feature of the apparatus is the automatic control. When the required pressure of steam is reached current is automatically shut off and should the pressure fall one point below the working point the current is turned on again. This regulation is so exact that the repair man is positive of results. He is assured that he will not overcure or undercure a tube or tire. There is no danger or fire hazard because there is no open flame. The only attention required is occasioned with the electric circuit. The manufacturers make liberal discounts to jobbers and the proposition should sell very rapidly because the device is tremendously practical.

Removal Sale.

Mr. S. Breakstone, the well-known Chicago dealer, is moving from his old location at 1526 Wabash Avenue, Chicago, Ill., to 1322 Michigan Avenue, in the same city. In connection with this removal Mr. Breakstone is offering a number of interesting bargains which will be found illustrated in our advertising columns.

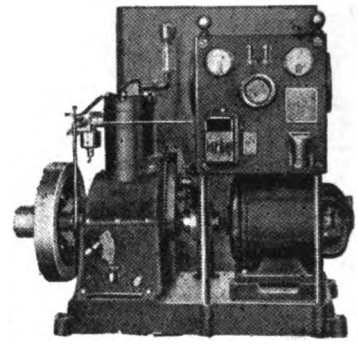
Farm Lighting Plants.

An electric lighting plant for farm and country home use which has been attracting a great deal of attention for some time is the Type K Mayhew-Electric, manufactured by the Mayhew Company of Milwaukee, Wis.

Longer battery life and the elimination of engine trouble are two objects that appear to have been successfully accomplished in the design of this lighting set. Its outstanding features are simplicity of engine design and effectual control of the charging rate while the batteries are being charged.

The engine is of the 4-cycle, water-cooled type which follows automobile practice quite closely, employing only features that have been thoroughly tried out and found to be absolutely reliable. Anyone who has had automobile experience can make all incidental repairs or adjustments that may be necessary on the engine, so that the outfit is one that the dealer can handle without finding it necessary to establish a service department.

The engine has considerable surplus power over that required for driving the generator and a pulley has been provided so that the outfit can be used for power purposes as well as lighting. The engine is started by pressing a small lever and the same lever is used to shut down the outfit when the batteries are charged. At a slight additional cost the outfit may be equipped with a device for automatically shutting down the engine



Mayhew Farm Lighting Plant. Type K.

when the batteries are fully charged. This is a feature which has served as an effective talking point on direct connected sets, but in practice has been found to be unimportant. It is for this reason that the makers of this plant furnish this as an extra and by doing so are able to furnish the outfit at a correspondingly lower price.

The switchboard is provided with a voltmeter and ammeter and also a rheostat for controlling the rate at which the batteries are charged. It is a well-known fact that in lighting plant service storage batteries can be made to last for from six to eight years by properly taking care of them, particularly in the matter of avoiding charging the batteries at too high a rate. In the Mayhew plant provision has been made to permit of giving the batteries the kind of attention that makes for long life and satisfactory service.

The generator has a capacity of 800 watts and batteries of various sizes are furnished to meet any condition encountered in farm home lighting. The engine and generator unit are the same in all cases.

The plant takes up very little room and requires a minimum amount of attention, and the operating cost is low. It appears to be a plant that meets the present demand in a most satisfactory manner.

Complete information and prices can be secured by writing direct to the manufacturer.

Two-Stage Air Compressor.

The United States Air Compressor Co. of Cleveland, Ohio, manufacture a complete line of air compressors in both two-stage and single stage types comprising twenty different units. These units vary in capacity from 1½ cubic ft. to 21 cubic ft. per minute and are designed to maintain pressures as high as

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TIRE-DOH

S-T-R-E-T-C-H-E-S

WITH THE RUBBER

EQUALIZES THE STRAIN

Ask Your Jobber's Salesmen About
These Two Live Selling Products

SOLD THRU THE RECOGNIZED TRADE

See Demonstration at the
Automotive Exposition, Sept. 14th-21st
Municipal Pier, Chicago

EVERYBODY NEEDS

SPEE-DEE

BECAUSE IT

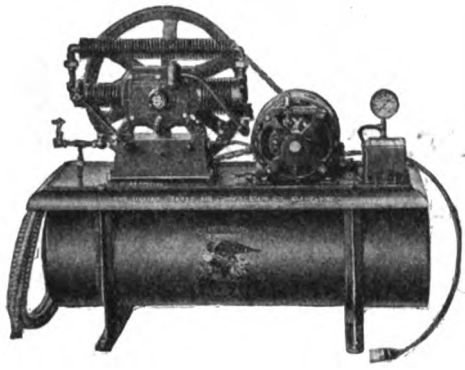
CLEANS EVERYTHING



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500 lbs. The manufacturers call attention particularly to the extreme efficiency obtained by utilizing the two-stage principle.

Every automobile driver realizes that a compound pump, so-called, gives more efficiency than the single type and it is



Two Stage Air Compressor Outfit.

upon the compound principle that the United States Two-Stage Air Compressor is designed. The manufacturers claim that there is less liability for leakage in this type of pump since the first cylinder pumps the air against a low resistance unit, into the second cylinder where it is brought up to the pressure in the tank. In other words, the difference between the atmospheric pressure and that in the tank is divided between the two units. Another advantage gained by this device is that less power is required to drive the small pump than would be required to drive a single switch machine.

Arrow Grip Chains.

Arrow Grip chains are individual units requiring (generally) six for each rear wheel. The chain used is regular machine or electrical weld of standard pattern.

Chains are held in position by the Arrow Grip device, a patented fixture (see cut) attached to spokes of wheel (see cuts.) This device consists of two upright, hook-shaped fingers, over which link of chain is placed. A snap latch prevents chain jumping lugs and becoming loose.

The clamp is so constructed that all strain and pull devolves upon the felloe and not upon the spoke. Arrow Grips are made in standard sizes, fitting any size or shape spoke. An entire set of chains can be attached or detached in a few minutes.

No special links or hooks required. If chain is lost any chain with link large enough to fit over lug can be utilized until replaced. Chains are cut to fit special width wheels.

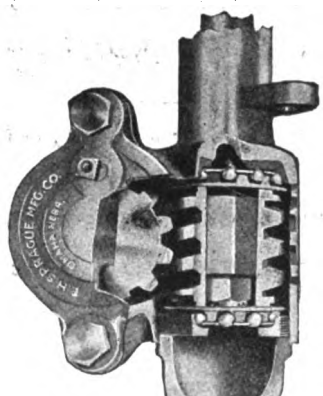
Prices cannot be quoted because they vary for different size wheels.

The Arrow Grips are now being Parkerized. This, you understand, is an absolutely rust-proof process which leaves the Grip with a beautiful black finish. This system is the same as that being used by the various U. S. Arsenals for rustproofing guns, sea mines, etc., which we believe is quite an improvement.

Arrow Grip chains are manufactured by the Arrow Grip Manufacturing Co., Dept. I, Glens Falls, N. Y., to whom all inquiries should be addressed.

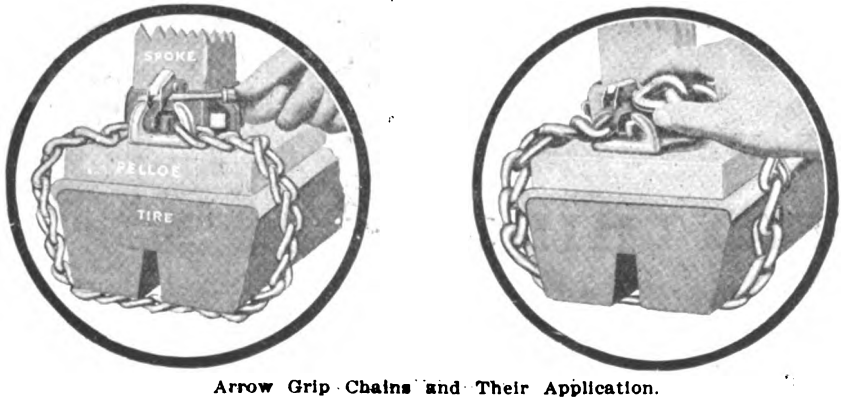
Sprague Worm Steering Gear For Fords.

Every Ford dealer or repair man should read the new advertisement which appears in this issue from the E. H. Sprague Manufacturing Co., Department 14, Omaha, Nebraska. Every Ford user realizes that his car needs stronger steering equipment, something to get him out of the ruts, prevent cramping and upsetting, and to hold the car to the road, relieve the strain on the arms, etc. The Sprague Worm Steering Gear answers this purpose admirably. It is made



Sprague Worm Steering Gear.

with ball bearings and floating shaft metal. The material used is high point steel with a housing of malleable iron. This is a better work steering gear than is used on many higher priced cars. It is a great seller for dealers and it is readily bought by Ford owners in every community.



Arrow Grip Chains and Their Application.

The D. & B. Carburetor.

The carburetor which is illustrated herewith was especially designed, developed and perfected for the Ford motor and is intended for exclusive use on the Ford car. This carburetor is springless, simple and efficient. The gasoline vapor with this device is measured and mixed with mechanical accuracy and



D & B Carburetor.

nothing left to springs or other unstable construction. By the use of this carburetor it is claimed, the Ford owner may be sure of a smooth running powerful motor with maximum mileage and absolute freedom from carburetor troubles of any kind. To install this carburetor no change in controls or manifolds is necessary and it can easily be put on the car by anyone. This carburetor is carried by most live dealers, but if your dealer does not carry it in stock, write direct to the manufacturer, O. C. Harrington Company, 341-345 North Crawford Avenue, Chicago, Ill. Dealers should also write for terms and prices as this carburetor is likely to be a big seller.

Conservation.

There is probably no business today which presents so many opportunities for waste as that of automobile repair and garages. Every garage owner and repair man should do his part in conserving fuel and material for war purposes. Then again he should run his garage with the least possible man labor and keep the latter at its greatest efficiency.

How to do all of these things is told in a free booklet issued by the National Association of Automobile Accessory jobbers, 1920 City Hall Square Bldg., Chicago, Ill., and we would suggest that everyone of our readers interested in garage work should write for this booklet since it contains many pointers relative to the running of a garage.

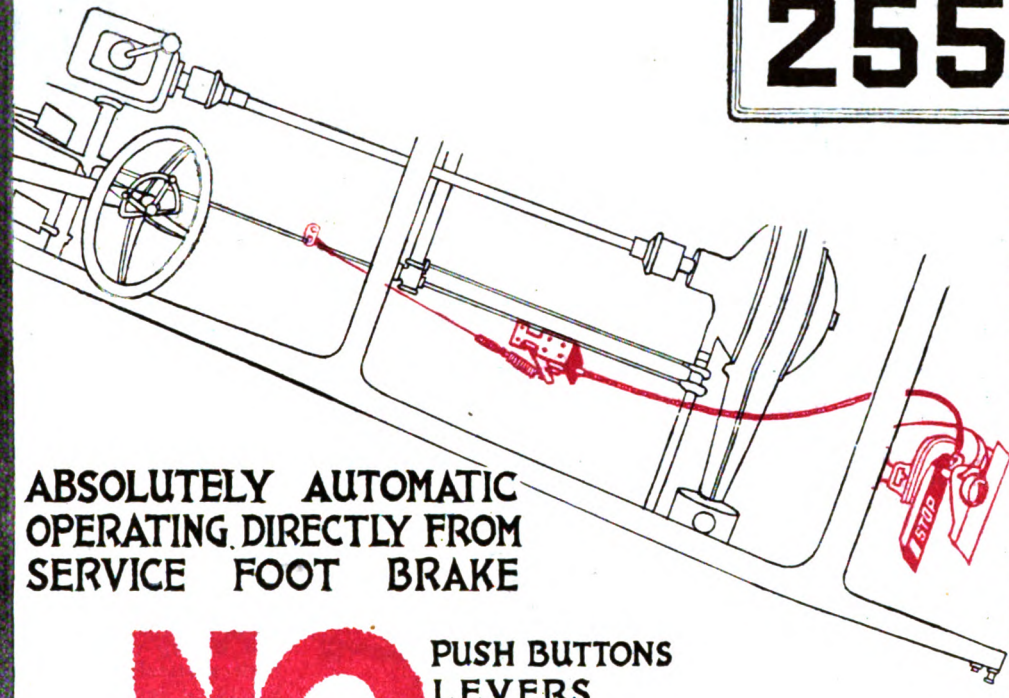
A New Auto Curtain Light.

The American Auto Window Company, 757 North Broadway, Los Angeles, California, has brought out a new auto curtain light, No. 61, which has great merit. This light consists of a perfectly and absolutely rust-proof frame using only oval head nickle-plated screws. Any and all causes for the cloth to buckle or wrinkle have been eliminated with this curtain light and at the same time the material is firmly held in place so that the cloth cannot possibly pull out. Readers who are interested should write direct to this Company for their new catalog which describes and illustrates the full line of curtain lights made by this well-known concern.

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THE LAW SAYS SIGNAL!
THE MAN BEHIND





ABSOLUTELY AUTOMATIC
OPERATING DIRECTLY FROM
SERVICE FOOT BRAKE

NO
PUSH BUTTONS
LEVERS
SWITCHES
VOLUNTARY ACT
COMPLICATED MECHANISM

COMER AUTO STOP SIGNAL

PRICE, $12.50—West of Denver, Colorado, $15.00

This Signal does **not** give the driver **more** to do. It give him **less** to do! The instant he presses his foot on the brake the Signal shows—**before** the car stops. It is a perfect god-send in crowded traffic, relieving the driver of all worry about the man behind.

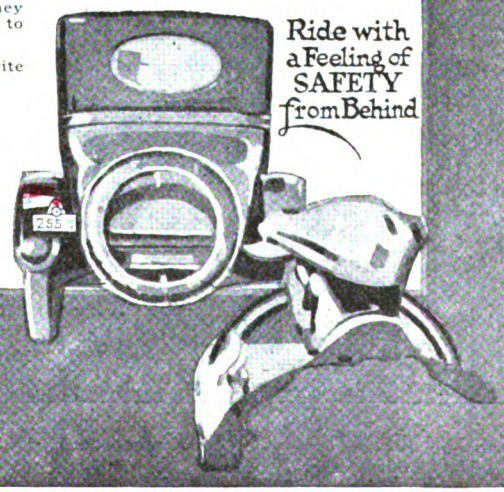
Motorists are buying them everywhere. Those who use them swear by them. They work **positively** by straight mechanical action that **cannot fail**!

If your dealer does not carry the Comer, send check or money order and dealer's name. We will ship prepaid. Be sure to state year and make of car.

DEALERS AND JOBBERS—There's good money in this. Write for full particulars.

HEADQUARTERS' OFFICE
THE WONDER SALES CO.
616-617 Hippodrome Bldg., Cleveland, Ohio

PACIFIC COAST AGENTS
HUGHSON & MERTON, Inc.
SAN FRANCISCO—LOS ANGELES—PORTLAND

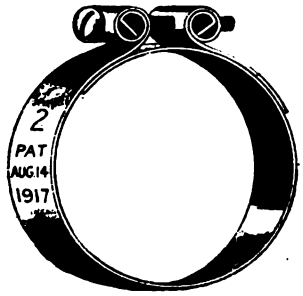




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Lock Roll Hose Clamps.

Good hose clamps are very important in any repair shop or garage. The Lock Roll Hose Clamps manufactured by the Federal Tin Company, Inc., and here

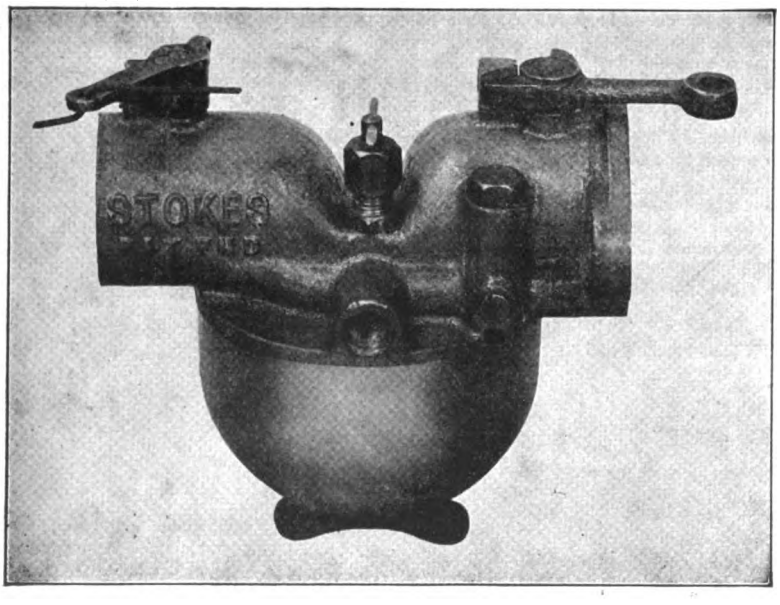


Lock Roll Hose Clamp.

illustrated, are scientifically constructed of steel and they cost no more than other makes. These hose clamps are strong, light and efficient, and they are also simple to use, as a screwdriver does the work. These clamps are nickle-plated or parkerized rust proof, and they come in stock sizes from ⅜-in. to 3½-in. by ⅛-in. variations. The dimensions given are the outside diameter of the hose. Send for samples, price list, and discount direct to the Federal Tin Company, Charles and Barre Streets, Baltimore, Md. The Lock Roll Clamps were formerly made by the Han-D Metal Products Corporation of Jersey City. This company has been taken over in its entirety by the Federal Tin Company, and this company with its larger organization facilities and selling organization conveniences are to put this clamp before the users in an extensive advertising campaign.

The Stokes Carburetor.

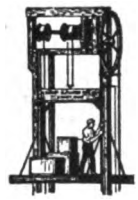
The trade is manifesting great interest in a new carburetor which has been placed upon the market by the Stokes Carburetor Co. of New York. Some of the points in favor of this carburetor are as follows: It starts and runs with a set spark; it throttles down to two to three miles per hour in high gear without stalling the engine, making it safe to drive through heavy traffic without racing and heating up your motor. It starts in zero weather with two or three turns of the crank. It takes hills easily on high that are impossible with standard equipment. It is claimed that carbon is eliminated by giving perfect combustion which is the simplest method of all. Forty-five miles an hour is easy for a Stokes. The construction of this carburetor is extremely simple, there being no moving parts to give trouble from wear or coagulation. The float chamber can be cleaned in two minutes, by releasing the Thumb-Nut. The installation can be made in 15 minutes by any owner, chauffeur or garage man. A 15-day trial is offered to reliable and interested persons and an unconditional guarantee for one year is given with each carburetor. All who are interested should write for prices and full particulars to the Stokes Carburetor Company, 711-717 East 104th Street, New York City. Dealers should write for the special agency proposition as good territory is now open and Ford agents and repair men are especially urged to write to this company.



Stokes Carburetor.

A Good Garage Elevator.

In many garages especially in the larger cities elevators are needed because it is necessary to store cars on more than one floor of the building occupied: An excellent line of elevators, especially adopted for garages, is made

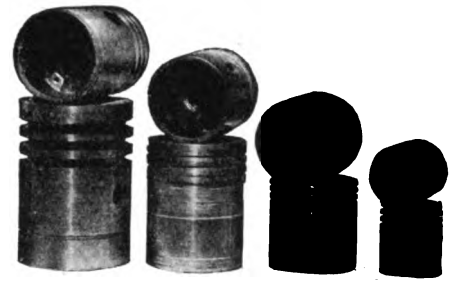


Garage Elevator.

by the Sidney Elevator Manufacturing Co., corner Miami and Shelby Streets, Sidney, Ohio. Write for catalog and prices.

Reboring Cylinders.

We want to call the attention of our readers to the fact that a rebored cylinder has as much service value as a new one in many ways. If a cylinder has been scored or damaged in any way its value may be restored by reboring and for this purpose the Storm Mfg. Co., Box a-26, Thompson, Iowa, manufacture reboring machines of varied capac-



Storm Light Weight Oversize Pistons.

ities from 2⅝ inches as well as a special Ford reborer machine.

This company is ready to furnish the trade with special oversize pistons for all makes of engines and our readers who are contemplating the reboring of their engines should write this company for full particulars.

Keep Cars In Condition.

Never before has the automobile builder had such an opportunity to demonstrate the life of his particular make truck or passenger car. Never before has the public been compelled to use their automobiles in such great effort.

Automobile reputations are made or lost during this period. The future of each particular make depends upon the length of service, and the ability of the manufacturers and dealers to keep the cars running now in use. If the cars sold can be kept in service no better reputation can be had, and no brighter prospects for future business will be desired.

Thousands of dollars worth of old parts have been junked every year which could often be repaired. Whole cylinder castings have been thrown away, when they could have been reground and new oversize pistons fitted, making a far better engine than when new.

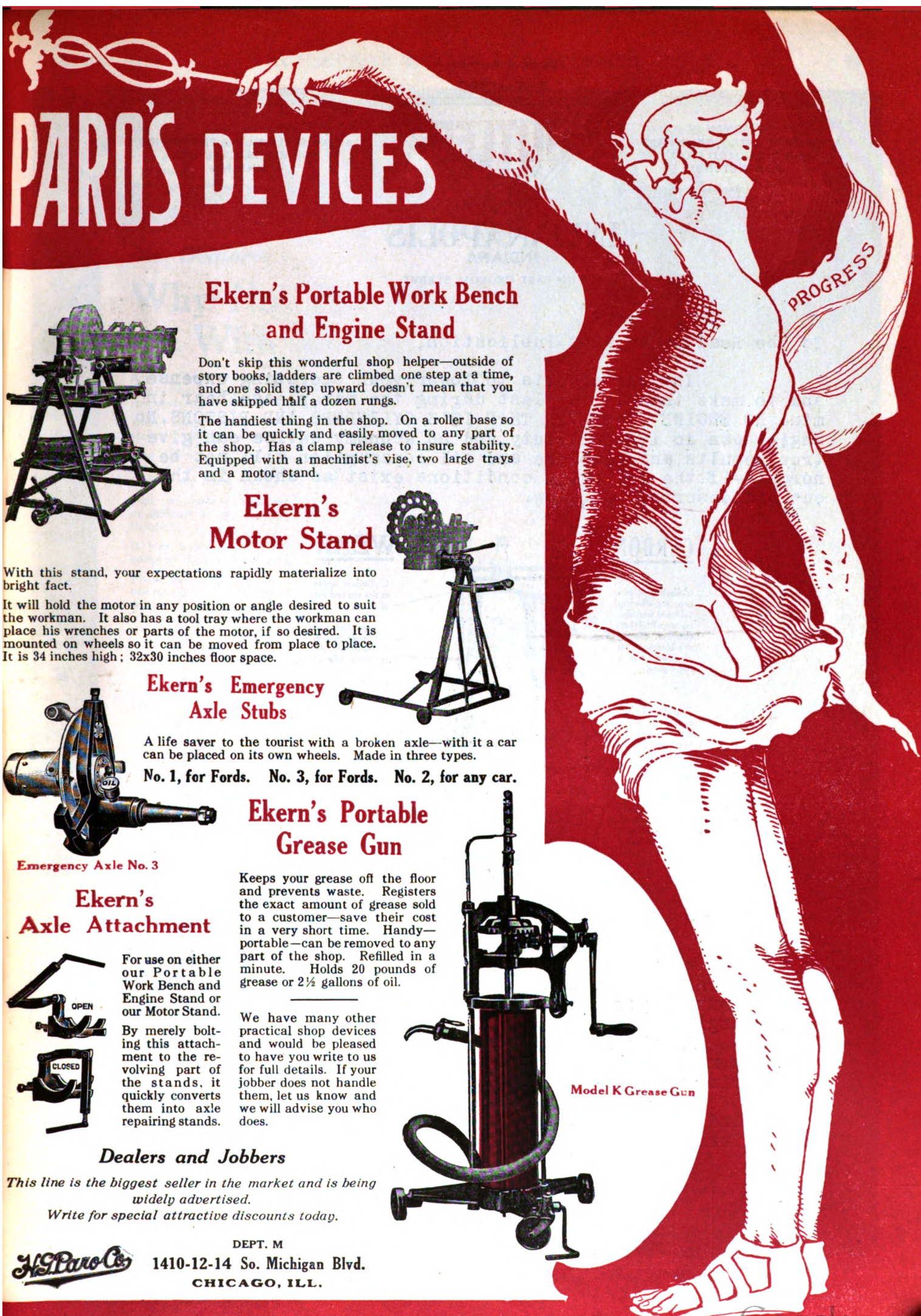
This war will help educate the people to save time, money and material, a lesson which will be instilled into every one and help make the American people stronger in the world.

Toliver Tubes and Tires.

The Toliver Tube and Tire Co., 847 Toliver Bldg., Denver, Colorado, offers a good money-making opportunity to dealers throughout the country. At present there are nearly 3,000 men in this country who are handling the Toliver tubes, tires, and accessories at a good profit. This company has a system of co-operation and sales assistance for their hundreds of representatives which they say practically guarantees success. No capital is necessary. This is an opportunity which many of our readers would do well to follow up by writing to this company for their tube and tire catalog and their special proposition to agents.

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PARO'S DEVICES



Ekern's Portable Work Bench and Engine Stand

Don't skip this wonderful shop helper—outside of story books, ladders are climbed one step at a time, and one solid step upward doesn't mean that you have skipped half a dozen rungs.

The handiest thing in the shop. On a roller base so it can be quickly and easily moved to any part of the shop. Has a clamp release to insure stability. Equipped with a machinist's vise, two large trays and a motor stand.

Ekern's Motor Stand

With this stand, your expectations rapidly materialize into bright fact.

It will hold the motor in any position or angle desired to suit the workman. It also has a tool tray where the workman can place his wrenches or parts of the motor, if so desired. It is mounted on wheels so it can be moved from place to place. It is 34 inches high; 32x30 inches floor space.

Ekern's Emergency Axle Stubs

Emergency Axle No. 3

A life saver to the tourist with a broken axle—with it a car can be placed on its own wheels. Made in three types.

No. 1, for Fords. No. 3, for Fords. No. 2, for any car.

Ekern's Axle Attachment

For use on either our Portable Work Bench and Engine Stand or our Motor Stand.

By merely bolting this attachment to the revolving part of the stands, it quickly converts them into axle repairing stands.

Ekern's Portable Grease Gun

Model K Grease Gun

Keeps your grease off the floor and prevents waste. Registers the exact amount of grease sold to a customer—save their cost in a very short time. Handy—portable—can be removed to any part of the shop. Refilled in a minute. Holds 20 pounds of grease or 2½ gallons of oil.

We have many other practical shop devices and would be pleased to have you write to us for full details. If your jobber does not handle them, let us know and we will advise you who does.

Dealers and Jobbers

This line is the biggest seller in the market and is being widely advertised.
Write for special attractive discounts today.

H. G. Paro Co.

DEPT. M
1410-12-14 So. Michigan Blvd.
CHICAGO, ILL.

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CHAS. R. BUTLER

EST - 1897

BUTLER MFG CO.

INDIANAPOLIS
INDIANA

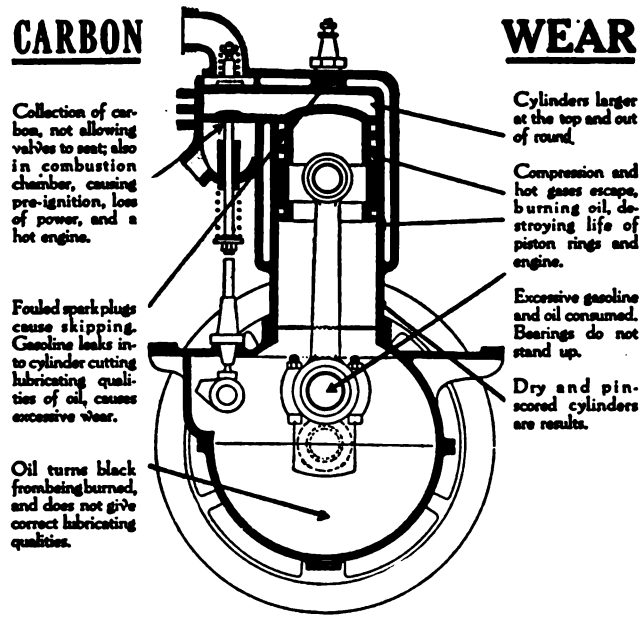
1128-1124 EAST GEORGIA STREET

MANUFACTURERS OF
ALUMINUM ALLOY, SEMI CAST
AND STANDARD CAST
IRON PISTONS

AUTOMOBILE PARTS, PISTON PINS
AND RINGS, CYLINDER
GRINDING

To The Readers of This Publication,

In your efforts to lower your operating expense, and to make the old car last during the war, please bear in mind NO ENGINE IS BETTER THAN IT'S CYLINDERS AND PISTONS. No engine can do it's full duty, and no economy device can give true results, and gasolene and oil consmuption will not be normal--if the following conditions exist as shown in the cut and description below.



THE CURE

is to have us regrind the cylinders and fit new pistons, rings, and pins. This will permit economy of operation and allow full development of power, besides lengthening the life and usefulness of the engine.

As the largest concern in the middle west, we have features no one else has, and can give service, workmanship and engineering which is extremely hard to surpass.

If your engine has the ailments as shown above, ship the cylinders, pistons, pins and rods to-day. Should you desire more information write us.

Yours for better engines,

BUTLER MANUFACTURING CO.,

Per. Chas. R. Butler

CRB
RHR

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QUICK-UNFAILING RECOIL

WITH ALL THE KICK LEFT OUT



HIGGINS

QUALITY SPRINGS

FOR REPLACEMENT

"Win the War First"—everything else is of secondary importance now—the life of the Nation is at stake. If it is *lost—everything* is lost.

Save! Conserve! *And Serve.* Do your bit—*and some.* That's our spirit—War First—*Win First.* And that's the spirit you'll find in Higgins Quality Springs. A clean fight to the finish—quality that doesn't know the meaning of defeat—that absolutely *refuses* to surrender to the most brutal attacks of bumpy travel.

The sort of spring service you need to protect your car—to conserve costs—and to render most efficient service in a military, purely patriotic or industrial way.

With us—it is Government demands above everything else—consequently, we make no unpatriotic or untruthful delivery promises. We are serving the Nation to the full extent of our ability. We will serve *you* as quickly as conditions will permit. And—this you may be sure of—the Springs you do get will rank up to your demands—no center bolt—no center breakage—or breakage in any section.

IF YOUR DEALER REFUSES TO SUPPLY YOU, WRITE US.

DEALERS—who are particularly interested in after-the-war trade development—write for catalog listing 500 different styles of springs and Selling Helps.

HIGGINS SPRING & AXLE COMPANY

DEPT 814

RACINE, WISCONSIN

NO HOLE-NO BOLT-NO HUMP-NO JOLT

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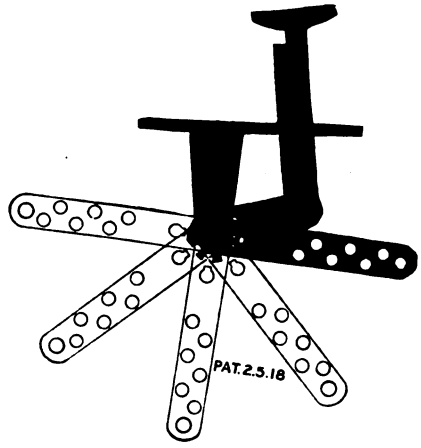
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Petry Universal Pedal.

The N. A. Petry Company of Philadelphia, Pa., are putting on the market an interesting product known as the Petry Universal Pedal which may be used for any one of a number of different things. It is fitted with an adjustable lever which may be placed in any number of different positions as shown on the accompanying illustration. This



Petry Universal Pedal.

device permits one to place it either upon the floor board or upon the toe board and so operate a whistle, a horn, accelerator, or cut-out either by pressure or by pulling upon the knob, according to the installation. The device should be of great interest to anyone desiring to install a special accessory on their car and we would advise our subscribers to send for a catalog.

Service Satisfaction for Trucks.

Auto trucks have been a wonderful factor in the present great war. In fact it will probably go on record after the war is over that it has been won chiefly by means of aeroplanes and trucks. One of the most important parts in the construction of a truck is found in the bearings as the trucks roll along on these bearings under tremendous loads. The Ahlberg Bearing Co., 2636 Michigan Avenue, Chicago, Ill., makes a specialty of regrinding, and reassembling all kinds of ball bearings and they state that in quality and workmanship these bearings, reground by the scientific method, are actually better than new bearings in many cases. It is not necessary to lay your truck up for the want of a bearing, but instead get in touch with the Ahlberg Bearing Company or one of its service branches and the bearing can be quickly put into condition again. This large company has service branches in the following cities: New York, Boston, Cleveland, St. Louis, Philadelphia, Minneapolis, Detroit, Portland, Oregon, Los Angeles, San Francisco, Atlanta.

An Agency Opportunity.

Many readers could make a considerable addition to their incomes by acting as agencies for the quick power and lighting outfits for farm houses which are manufactured by the Western Electric Co. More than forty years of electrical manufacturing experience is back of all these Western Electric Power and Light outfits. If the reader of this article chooses to be the man in his particular community to represent these outfits he will make no mistake about it. The Western Electric Co. backs up its agencies by means of extensive advertising in such well-known organs as the Country Gentleman and other leading farm papers. Readers who are interested should fill out the coupon which appears in the full page advertisement of this Company in the present issue of our magazine and send it in direct to the main office of the Western Electric Co., 195 Broadway, New York City.

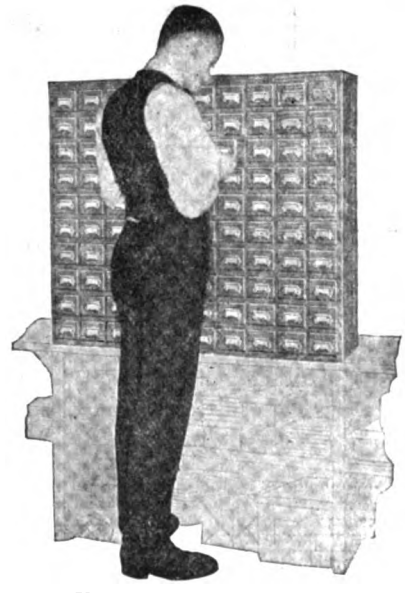
Eccolene Carbon Reducer.

Undoubtedly carbon is the greatest bugaboo of the autoist and seemingly the average driver does not know how to prevent the formation of this product. The Edward A. Cassidy Co. Inc., 280 Madison Ave., New York City, are marketing a product termed Eccolene which they guarantee to give satisfaction or money will be refunded.

This product is said to cause an increase in economy of at least 20%. Eccolene is sold by the gallon and designed to be mixed with gasoline. They claim that when this product is used, carbon does not form in the cylinders and that increased efficiency results.

Universal Screw Cabinet.

The Universal Screw Cabinet is a convenient, serviceable and economical cabinet designed for screws, brads, nails, nuts, bolts, automobile accessories and other small articles. It keeps shelves clean and prevents duplication of stock. It will save its small cost many times in a year in providing a place where every screw or part may be put and where everything can be found instantly when needed. It is substantially built of oak and steel. The back panel is of



Universal Screw Cabinet.

sheet steel, making the cabinet proof against dust and vermin. The sides and bottom of each drawer are made from one piece of sheet steel. The back and front of each drawer are wood, making an extremely light and strong drawer that will not stick or bind. The finish is light golden oak, polished brass drawer pulls and card holders. Drawers are 8x3x2½ inches, inside measures.

The Universal Screw Cabinet is made by the Hobart Brothers Company, Troy, Ohio, being furnished in two sizes, 50 drawers and 100 drawers (as illustrated) at reasonable prices.

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Classified Advertisements

Under this head will be printed advertisements of **Second Hand Cars Wanted or for Sale, Accessories of any kind Wanted or for Sale, Shops for Sale or Rent, Situations or Help Wanted, Second Hand Tools or Machines for Sale or to Exchange,** at the uniform price of **five cents a word,** including the name and address, for each insertion, payable in advance. **No advertisement will be inserted for less than 75 cents, however small.** Remittances may be made in postage stamps or in any convenient way.

Special rate of 30 cents per nonpareil line for each insertion if taken for 12 consecutive times.

Classified Advertisements

Address MOTOR VEHICLE PUBLISHING CO., 71-73 Murray Street, New York.

Tires

Our Double Tread Tires

are saving money for our customers all over the country. They can do as much for you. Write for catalogue and price list immediately and see the offer we are making you.

M. Liben & Co.

205A W. 48th Street NEW YORK CITY

Exceptional Values IN DOUBLE CHAIN STITCHED TIRES

Size	Plain	Non-Skid	Size	Plain	Non-Skid
28x3	$4.50	$5.00	35x4	$10.00	$11.00
30x3	5.50	6.00	36x4	10.00	11.00
30x3½	6.50	7.75	34x4½	11.00	12.00
32x3½	8.00	9.00	35x4½	11.00	12.00
31x4	9.00	10.00	36x4½	11.00	12.00
32x4	9.00	10.00	37x4½	11.00	12.00
33x4	9.00	10.00	35x5	11.00	12.00
34x4	10.00	11.00	36x5	12 00	13.00
			37x5	12.00	13.00

Have your own tires Double Treaded by the same process. Our charges are only 40% off the above mentioned prices.

Send your order to our nearest office.

LEON JAFFESS, Inc.

252 West 55th Street, New York City — 6106 Euclid Avenue, Cleveland, Ohio

Double Tread Tires

Notice Our Prices Before Going Elsewhere

PRICE LIST

Size	Plain	Size	Plain
30x3	$5.00	35x4	$9.00
30x3½	5.50	36x4	9.50
32x3½	6.50	36x4½	10.00
32x4	7.00	36x5	10.00
33x4	7.50	37x4½	10.00
34x4	8.00	37x5	10.50
34x4½	8.50		

For Non-Skid, 50 cents more on all sizes.

We Carry a Full Line of New and Used Tires & Tubes

GINSBERG & BERKOWITZ, Inc.

236 WEST 48th STREET, NEW YORK

DEALERS AND BUYERS
Send for prices on Good Factory Seconds.
STAR RUBBER COMPANY
1771 Broadway Tel. 123 Columbus New York City

INSYDE TYRES,
inner armor for automobile tires. Double mileage. Prevent punctures and blowouts. Details free. Agents wanted. Big profits.
AMERICAN ACCESSORIES CO.,
Dept. AD3, Cincinnati, Ohio

Tires

BUY EARLY AND SAVE MONEY

Double Tread Tires and Tubes

GUARANTEED

Come to the Tire Clearing House—here are prices—clear cut and plain as daylight. We buy wholesale the best "try out" Tires—and you get the benefit—you want truthful tires, and truth is never crushed to earth if given a square deal—real truth is puncture proof—

SO ARE OUR TIRES.

Size	Plain	Non-Skid	Tubes
28x3	$4.40	$4.95	$2.00
30x3	5.50	6.05	2.00
30x3½	6.60	7.15	2.50
32x3½	7.15	7.70	2.75
34x3½	8.25	8 80	3.00
30x4	7.70	8.25	2.75
32x4	8.80	9.35	3.00
33x4	8.80	9.90	3.50
34x4	8.80	9.90	3 50
35x4	9.90	11.00	3.60

Get your order in quick for goods listed here—by all means get in touch with us for further information about our special process—it means money in your pocket. Get in right—write today—yes—today.

Look up rating in Dunn's or Bradstreet's.

Size	Plain	Non-Skid	Tubes
36x4	$9.90	$11.00	$3.60
32x4½	9.90	11.00	3.75
34x4½	11.00	12.10	4.00
35x4½	11.00	12.10	4.10
36x4½	11.00	12.10	4.25
37x4½	12.10	13.20	4.35
34x5	11.00	12.10	4.50
35x5	13.20	14.30	5.00
36x5	13.20	14.30	5.00
37x5	13.75	14.85	5.00

For (non-skid) sizes up to 32x4, 50c extra; all other sizes $1.00 extra.
For rebuilding your old tires we charge you 60% of the above prices.

B. LIBEN & COMPANY

261-A West 54th Street NEW YORK CITY 112-A East 110th Street

THE HOME OF DOUBLE TREAD TIRES

PRICE WRECKERS

Double Tread Tires with Double Lock Stitch

30x3	N. S.	$5.50	34x4½	N. S.	$8.50
30x3½	"	6.50	35x4	"	9.00
32x3½	"	7.00	36x4	"	9.50
31x4	"	7.25	36x4½	"	10.00
32x4	"	7.25	36x5	"	10.00
33x4	"	7.50	37x4½	"	10.00
34x4	"	8.00	37x5	"	10.00

We carry a full line of Firsts and Factory Blemished Tires and Tubes at moderate prices.

ROYAL TIRE EXCHANGE

282 Halsey St., Newark, N. J.

TIRE BARGAINS. — Firsts, Seconds, and Factory Blemished Tires and Tubes. Our prices are below the market—see for yourself. Write for price list.
Manufacturers Surplus Tire Co., 789 Seventh Avenue, New York

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Dealers in Magnetos of all Makes. Lighting Systems and Self Starters.

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PYRMA ALUMINUM HEEL PLATES cover or prevent unsightly holes in floor board coverings, 75 cents each. These plates and PYRMA ALUMINUM MATTING for sale by all up-to-date dealers. Metallic Automobile Matting Co., Rochester, N. Y.

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30 x 3	9.89	10.56	2.35
30 x 3½	12.50	13.39	2.85
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32 x 3½	13.25	14.76	3.16
34 x 3½	16.92	17.76	3.23
31 x 4	18.98	20.60	3.61
32 x 4	19.74	20.99	3.86
33 x 4	20.99	21.89	4.04
34 x 4	21.24	22.43	4.16
35 x 4	22.00	25.99	4.26
36 x 4	24.99	26.00	4.41
32 x 4½	25.75	27.70	4.49
34 x 4½	28.82	30.29	4.92
35 x 4½	28.96	31.59	5.14
36 x 4½	30.61	31.97	5.36
37 x 4½	34.50	35.72	5.41
35 x 5	35.26	36.89	5.52
36 x 5	36.50	36.98	5.57
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These and other sizes always in stock

A 5% discount from above prices on orders of six or more tires. On orders of 12 or more tires, discount 10%. Orders mailed at once receive best selection from stock on hand.

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In these days of stress to procure deliveries of merchandise, it is of particular interest and benefit to jobbers that J. H. Faw, Inc., at 37 Warren Street, New York City, have increased their stock of Ignition Wires and Lighting Cables to take care of this demand.

They carry about forty numbers of wires, aggregating five million feet and have been making prompt shipments on practically all numbers. One of their specialties, the "Fawsco Ignition Assembly" or Ford Harness has proven its continued worth by increased popularity.

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Here's the only steam vulcanizer that fire laws permit anywhere. No open flame, no boiler, no fire risk or danger of explosion. And absolutely automatic. A boy can run it. Steam pressure absolutely maintained within one pound variation. Hitch it to any electric light socket. Endorsed by 17 leading rubber companies.

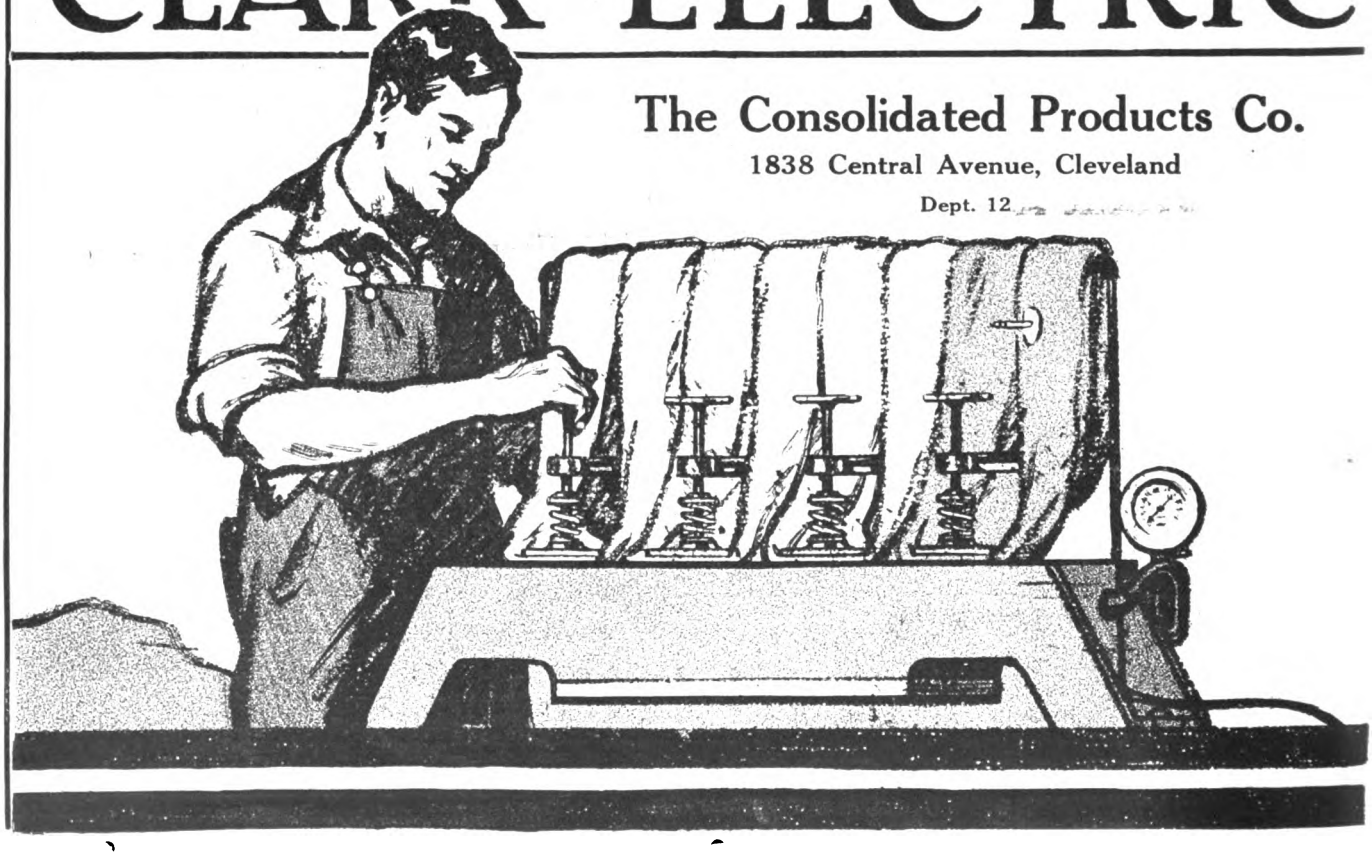
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Never before was there such an opportunity for the garageman, for the accessory dealer and jobber, even the gasoline and oil stations.

Perhaps you have been taking in tube and tire repairs but sending them to somebody else to be vulcanized. You don't have to do that any longer. Perhaps your local fire laws would not permit vulcanizing on the premises. Perhaps you didn't have enough work to justify firing up one of the old style outfits, with its big fuel bill.

But you can install a Clark Automatic Electric-Steam Vulcanizer anywhere. It makes 60 pounds of steam in 25 minutes. In five hours' use, it burns only one hour's current. ***It costs less to buy and to run that any other vulcanizer of equal capacity.***

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It's a steam vulcanizer—that's why the ***big rubber companies all endorse it.*** Ask any of them. It's automatic—after reaching the required pressure, the current is opened and shut intermittently whenever the pressure falls or rises **one** pound!

You positively cannot over-cure a tube or tire on the Clark Automatic Electric-Steam Vulcanizer. The steam pressure and temperature you set it for is absolutely maintained. You can go away and leave it—no danger.

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$22.14 profit for 3 hours' work

50 tubes repaired, average 50c each - - - - $25.00

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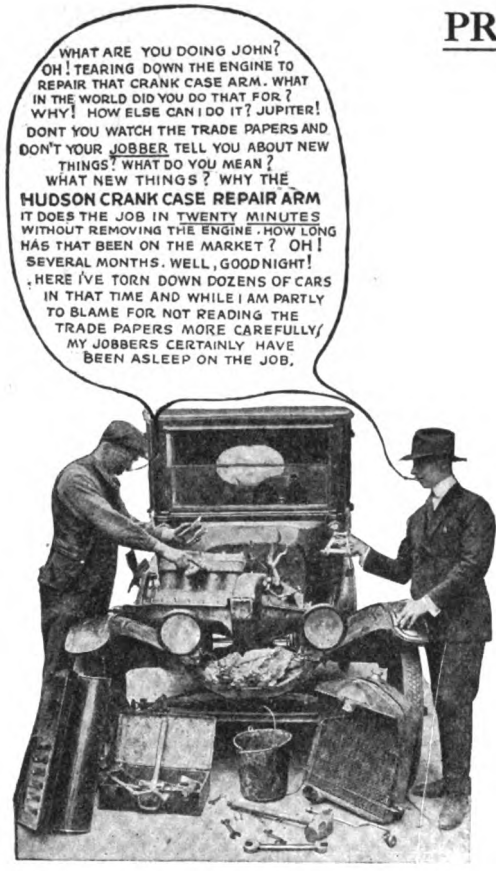
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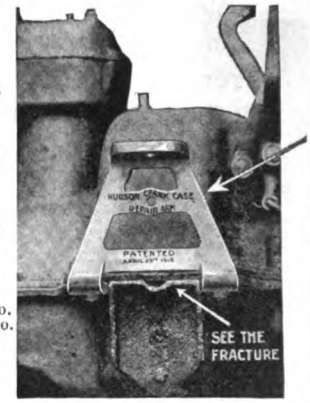
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"I'll tell you what the STOKES CARBURETOR is doing for me, Joe!"

"To start with, I found that the first customer brought in two more, and every customer becomes enthusiastic and unconsciously an effective salesman. And best of all, Joe, they don't return them, they keep them.

"You ought to hear the enthusiastic remarks they make!—such as, 'It makes my Ford run like a steamer—so smooth, quiet and responsive!' 'It's a real delight to start my car in Winter as well as in Summer!'

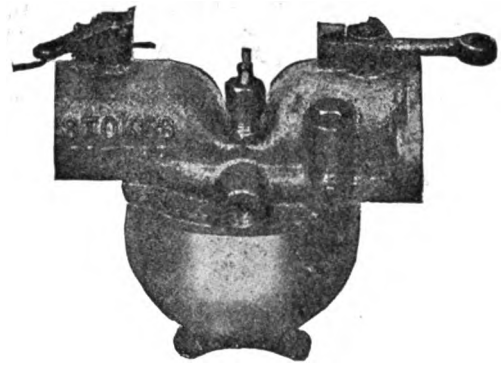
"Believe me, I like that 'quick get away' and that wonderful 'STOKES PEP' it gives the motor! And POWER! Say, jump in and let me show you how she takes that big pet hill that I could never make on high before.

"And did you notice the simple adjustment? You can't go wrong on it. 'It makes my Ford run as smooth and flexible as an eight-cylinder car!' 'It's the biggest surprise I ever had—it makes her climb hills so easily that it's simply wonderful!'

"That's what they say, Joe, and it's all true—every word of it. At first, I only handled it as a dealer. But seeing it was such a good thing I took the jobber's proposition for my county. I have a man out on the road now establishing dealers throughout the county and it is making friends for us everywhere.

"It is increasing their mileage per gallon of gas on the average fully 35%. That's saving quite some money for them, and Gas for our country and our Allies. And for me, it's the easiest way of making money that I know of.

"As a good friend, Joe, take it from me, don't you lose a single minute just thinking about the proposition—if you do, somebody else 'll get ahead of you;—they are all learning about it being such a good seller—jump to it and you'll find yourself just as enthusiastic as I am."



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The carburetor not only sells itself, giving you liberal commission, but it makes friends for you whose other repair work you get.

It so markedly surpasses all other makes on the 5 vital points:—EASY STARTING; FLEXIBILITY; POWER; SIMPLICITY; ECONOMY—that it is becoming known everywhere, as "*The Leading Carburetor.*"

Put on for a 15 days' trial, it never fails to add a new booster to its rapidly growing list.

The price is $15.00. We furnish a written guarantee. If a purchaser is not entirely satisfied after 15 days' trial that it is the best carburetor in the world to date, the purchase price will be refunded.

Write for full particulars today. Mail coupon herewith attached and we will give the order our prompt attention.

The Stokes Carburetor Co., Inc.

781-3 East 142nd Street :-: New York City

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STOKES CARBURETOR CO., Inc.

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Please send me one carburetor C. O. D., with full directions, for trial. Price, $15.00—less dealers' discount. It is understood that if within 15 days I find it not satisfactory and as represented that I can return it and you will refund my money.

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Short of Help? This Hoist Does the Work of an Extra Man

Keep Your Workmen Satisfied—Let a WEAVER HOIST Do the Heavy Work

WEAVER Auto Hoist



ONE MAN WITH THIS HOIST CAN DO ALL KINDS of WORK AROUND A CAR

He can pick up the front or back of a car in 2 minutes' time, making accessible the car's under mechanism. Unaided he can take out a motor or remove a body—in a fraction of the time it would take 2 men to do the same work by hand. He can roll the crane to a car quicker than 3 men can shove a car to the crane. In short, every garage—and repairman—can save many times over in time and wages the initial cost of a Weaver Auto Hoist.



SAFETY

This lifting mechanism is operated by WORM DRIVE;—no treacherous ratchets to slip or break. The chains are heavy and are each tested INDIVIDUALLY far in excess of their required strength.

The bases are made very broad in order to prevent the Hoist turning over under any circumstances.

TELESCOPING FRAME

The height of the frame may be increased one foot by means of its own lifting mechanism. This is often a great convenience in raising the rear of a closed car.

SINGLE OR DOUBLE CHAIN

When so desired, the burden can be handled by a single suspension, as shown in the small cut in the lower right hand corner. This is done by simply dropping the chain over the center roller.

CONSTRUCTION

Frame of heavy five inch channel steel; large ball and roller bearing casters; lifting leverage, 500 to 1; capacity, 3,000 lbs.; height, 8 to 9 ft.

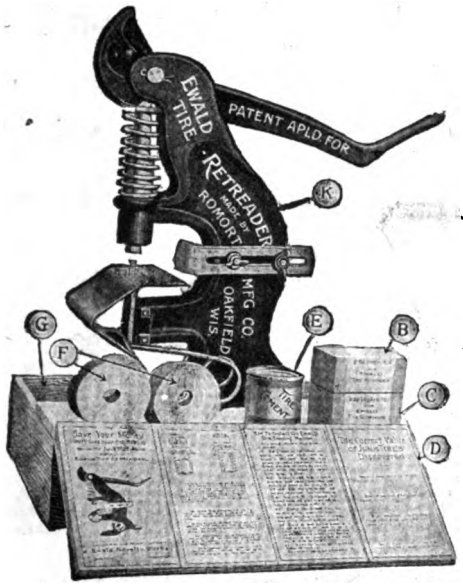
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B.—250 SPECIAL STAPLES, ½-IN. LONG
C.—250 SPECIAL STAPLES, ⅝-IN. LONG
D.—FULL SHEET OF DIRECTIONS
E.—1 CAN TIRE CEMENT
F.—2 ROLLS RUBBER RELINER
G.—1 SHIPPING BOX

One Repair Man Writes:

"IT PAID FOR ITSELF THE FIRST DAY"

It is easy to staple 10 tires a day with the Ewald Tire Retreader at $2.50 per tire.

How would you like to make $25.00 and over per day or $650.00 per month?

Here is a chance for the Tire Repair Man to coin some money.

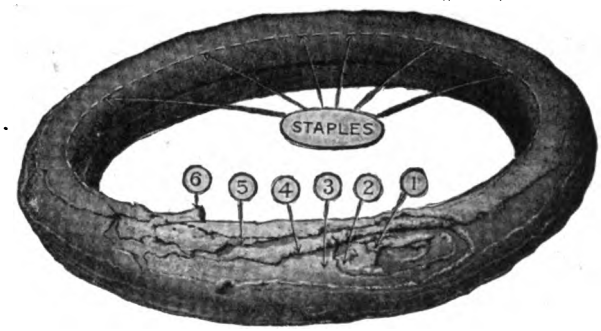
Auto drivers will have to have their tires repaired because the Government is taking 70% of all the rubber. It is up to the Repair Man to help save all the tires he can.

Save Your Money

Don't Give Your Old Tires to the Junk Man

INSTALL AN

Ewald Tire Retreader



The above tires were stapled by the Ewald Tire Retreader and then run over two thousand miles. You can see the fabric at 1, 2, 3, 4, 5 and 6 as it wore away, but not a single staple pulled out.

For Sale By Dealers and Jobbers Everywhere

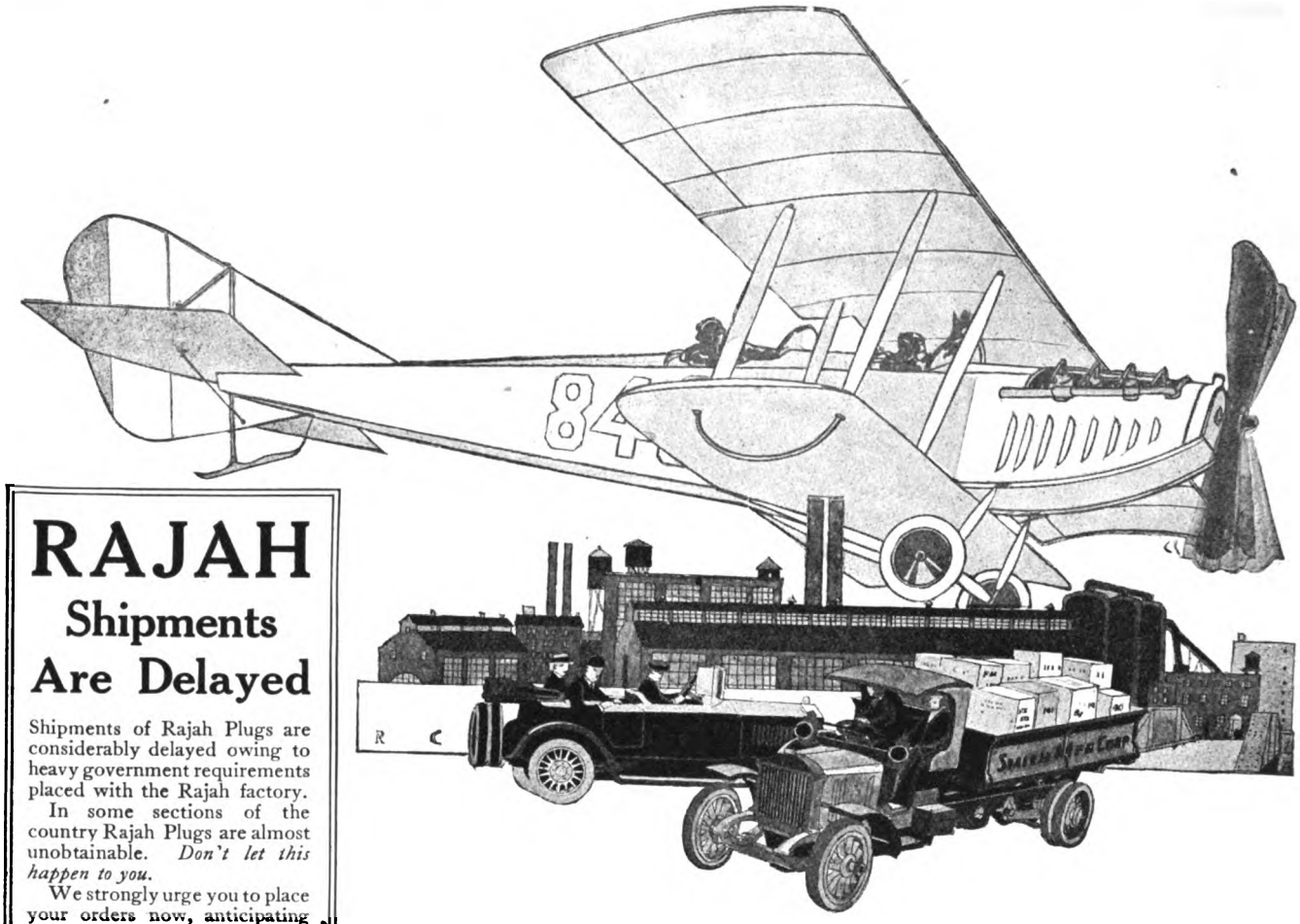
Hundreds in Daily Use, and Thousands of Tires Are Saved by the *"EWALD"* Process

Every Tire Repair Shop Needs One

Factory Sales Department
THE ZINKE COMPANY
Chicago, U. S. A.

Manufacturers
ROMORT MFG. COMPANY
Oakfield, Wis.—Chicago, Ill.

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RAJAH

Shipments Are Delayed

Shipments of Rajah Plugs are considerably delayed owing to heavy government requirements placed with the Rajah factory.

In some sections of the country Rajah Plugs are almost unobtainable. *Don't let this happen to you.*

We strongly urge you to place your orders now, anticipating your requirements as far ahead as possible to insure your having stock on hand.

Rajah Terminals and Adapters

are furnished so that Rajah Plugs can be used with any car.



Rajah Regular and Ferrule Clip Terminals

Adjustable to any cable and with ferrule to fit any cable. With the extra collar supplied both can be used with any make of plug.



Rajah Thumb Nut and Stud Terminals

The Thumb nut is an adapter for Dodge, Ford, Hup, Hudson, Maxwell, Mitchell, Packard Twin Six and Pullman. The Stud for Buick, Chevrolet and Oldsmobile.



Rajah Ball Terminal

Adapter for Franklin, Locomobile and Willys-Knight.

Manufactured by

Rajah Auto-Supply Co.
Bloomfield, N. J.

Sales Department
Edward A. Cassidy Co.
280 Madison Ave., New York

The Super-power plug

Rajah is the spark plug demanded by aviators. It is the choice of automobile racers and hill climbers. It is found in the fastest speed boats.

It gives the same reliable results in pleasure cars or motor trucks—ignites ALL the gas with a lightning-hot spark, adds power and quicker pick-up.

The aviator entrusts his life to Rajah Spark Plugs; the racer counts on them for his success. You can cash in on their ability to give any car a big margin of power and speed.

Rajah Plugs achieved their reputation by delivering exceptional service under severe conditions.



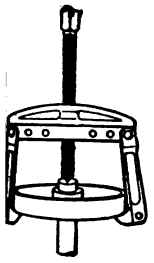
Sell a *complete set* of Rajah Plugs and give your customers the full benefit of the change.

RAJAH SPARK PLUGS

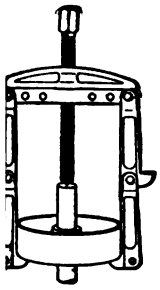
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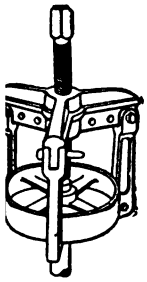
THE CRANE WHEEL AND GEAR PULLER



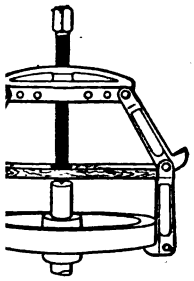
-Arm Puller removrk near end of shaft.



k beyond reach of t of arms.



e-Arm Puller pulling three points will recollars and work that be started with the m pullers.



-Arm Puller on work e diameter (a piece d being used as a er).

The most practical device for safely removing fly wheels, auto wheels, gears, cams, sprockets, collars, couplings, commutators, propellers, etc.; bending pipe, straightening shaft and removing universal joints.

The screw has a flat end with inserted tempered tool steel point, that will not spread centers. Makes its own center on work that has none. The strain is taken on the flat end of the screw. The screws are made of high carbon steel and case-hardened all over.

No. 0 Puller — Designed for all kinds of small work — including timing gears, magneto and pump shaft gears, etc., that are designed to be removed by stud-bolts screwed in tapped holes in the web. The forked stud-bolts, shown attached to the hook end of the arm with pins, are furnished blank and can be drilled and tapped by the purchaser for the proper thread of his work: and case-hardened headless set screws can be used for the stud. This puller takes light work 5 inches in diameter and 3 inches from the end of shaft. It has the new patent Locking Arm, forked stud-bolts and case-hardened screw.

Made with two arms only, weight 2½ lbs, each **$2.50**

Both **No. 2** and **No. 3** Pullers are made in 2 and 3 Arm styles.

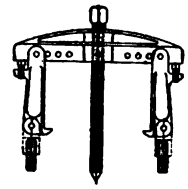
Furnished with one set of Combination Hook and Extension Arms and one set of Thin Jaw Arms.

No. 2 Puller — Takes work 9 in. in diameter. One set of arms reaches 5½ in.; two sets arms reach 11 in. This size is particularly adapted for the average garage and repair shop.

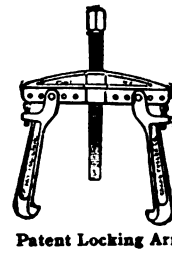
Two-Arm style, weight, boxed, 16 lbs., each ..... **$ 8.00**
Three-Arm style, weight, boxed, 19 lbs., each **$10.50**

No. 3 Puller — Takes work 13 in. in diameter. One set arms reaches 6 in.; two sets arms reach 13 in. This size will meet the requirements of work of all kinds.

Two-Arm style, weight, boxed, 28 lbs., each **$10.00**
Three-Arm style, weight, boxed, 39 lbs., each **$13.00**



No. 0 Two-Arm Puller



Patent Locking Arm

NEW CRANE PULLER FEATURES

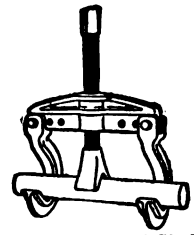
Makes this popular device more practical and valuable than ever.
Every garage and repair-man will appreciate these new attachments.

PATENT LOCKING ARM

A most valuable feature — prevents the arms from slipping off the work.

No 2 Locking Arm — Reaches 9 inches, fits either two or three arm style of the No. 2 Puller. Weight 2½ lbs., each **$1.00**

No. 3 Locking Arm — Reaches 10 inches, fits either two or three arm style of the No. 3 Puller. Weight, 3½ lbs., each **$1.25**



Pipe Bending and Shaft Straightening Attachment

PIPE BENDING AND SHAFT STRAIGHTENING ATTACHMENT

For use with Two-Arm Pullers only: consists of a pair of arms with hooks at right angles to the hooks on the regular arms and a forked end for the screw. It is indispensable in a repair shop for straightening propeller and jack shafts, bending exhaust pipes, removing universal joints, etc.

No. 2, Wt. 6½ lbs., each ..... **$2.75** **No. 3**, Wt. 9½ lbs., each **$3.50**

EXTRA SIZE NO. 3 BEAMS

No. 3 X Two-Arm — Takes work 16 in. in diameter. Weight 13½ lbs., each **$5.56**

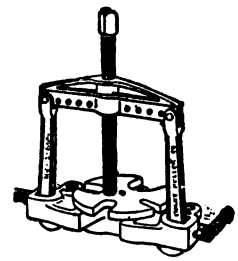
No. 3 X Three-Arm — Takes work 28 in. in diameter. Weight, 32 lbs., each **$12.00**

ARBOR PRESS BASE

This attachment bolts to the bench. Your Puller is fastened to it with two set screws, making an excellent and practical arbor press.

No. 2 — 2-Arm Base, takes work 7 inches in diameter, weight 18 lbs., each **$5.50**

No. 3 — 2-Arm Base, takes work 11½ inches in diameter, weight 30 lbs., each **$7.50**



Arbor Press Base

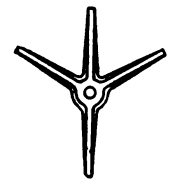
CROWFOOT BEAM

A combination two and three arm beam does the work of both.

No. 2 — Weight 7 lbs., each ..... **$4.00** **No. 3** — Weight 13 lbs., each **$5.94**

PRICE LIST OF EXTRA PARTS

No. 2 PULLER		Each	No. 3 PULLER		Each
2-Arm Beam	Weight 4½ lbs.	$2.56	2-Arm Beam	Weight 7½ lbs.	$3.56
3-Arm Beam	" 5½ "	3.34	3-Arm Beam	" 10½ "	4.44
Screw	" 2½ "	2.00	Screw	" 5½ "	2.20
Combination Arms	" 1½ "	.80	Combination Arms	" 2¼ "	1.00
Pins		.06	Pins		.06



Crowfoot Beam

INSTRUCTIONS FOR USING

KEEP SCREW WELL LUBRICATED with graphite grease, especly for heavy work. **Also grease point of screw to prevent cutting, The tendency to twist off work caused by friction of screw in the am under heavy strain with the Two-Arm Puller should be ercome by holding against this strain with a monkey wrench the end of beam.** The Three-Arm Puller is provided with a lever this purpose. A piece of emery cloth or sandpaper put under the oks rough side down will keep them from slipping.

Tie or wire the arms to the work. When removing fly-wheel with spokes and the hooks will not fit down on the hub, turn the arms around with hooks facing outward, place parallel pieces of iron across spokes for the hooks to pull on, and tie or wire them to hold securely in place.

When using the Two-Arm Puller, be sure to have point of screw directly in center line of hooks and not a little to one side. In pulling on irregular work, care should be taken to have each arm pull evenly by placing blocks under arm on short side of work or the screw will be bent.

JARANTEE. **We guarantee the materials and workmanship in these tools and will replace any defective part without question and absolutely free of charge upon return of defective part to us.**

CRANE PULLER CO.

LAKE STREET ARLINGTON, MASS.

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JEWELL BATTERY GAUGE

The Ever Watchful Guardian Of Your Battery.

Tells you exactly what you ought to know exactly when you should know it.

Most of the ills to which a storage battery is subject may by easily cured if prompt action is taker.

A lot of things may happen between twice-a-month hydrometer tests that will result in destruction before the next test is due.

The **Jewell Battery Gauge** gives prompt warning of short circuits, low water, low charging current, excessive draft through starter and in fact practically every trouble that ultimately causes disaster to the battery.

Every car owner who has experienced the unpleasantness of hydrometer tests, or paid big battery repair bills, buys on sight.

Approved by battery manufacturers, service stations and experts.

Live dealers and garage men, get busy. Here is a device that is worth many times the price to the buyer and pays big profits to the dealer.

You can't afford to overlook it. Attached by anyone in half an hour.

Price, $6.00

Manufactured by

THE JEWELL ELECTRICAL INSTRUMENT CO.

1646 W. Walnut St., Chicago

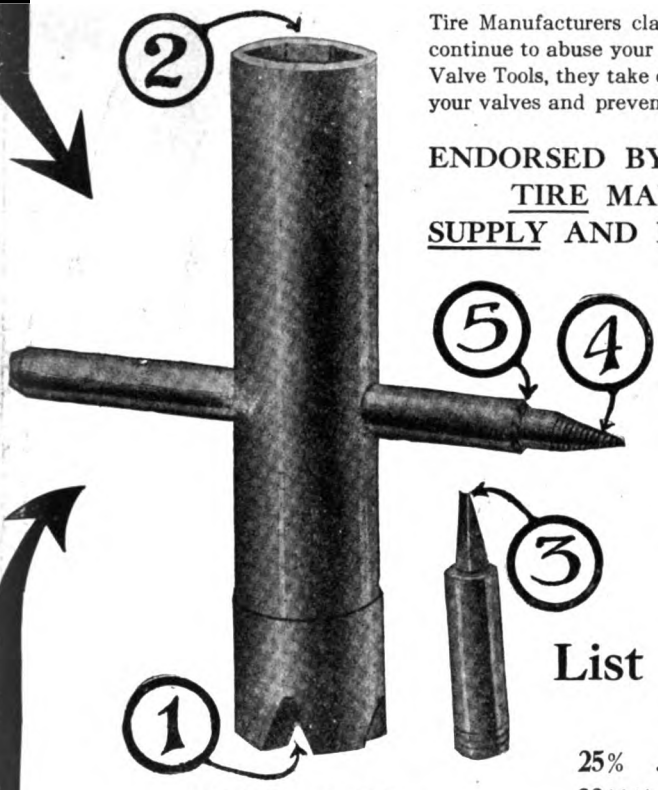
Exclusive Sales Representatives, GRAY-HEATH CO., 1440 Michigan Avenue, Chicago

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IT'S DANGEROUS

To the Life of Your Tires to Be Without A & H Valve Tools

Tire and Tube Expenses are one of the largest items the owners of automobiles have. **The Tires are the most abused part of the car, due to receiving improper care and attention, insufficient air and neglect in not having air-tight valves.**



VALVE REPAIR TOOLS
(Actual Size)

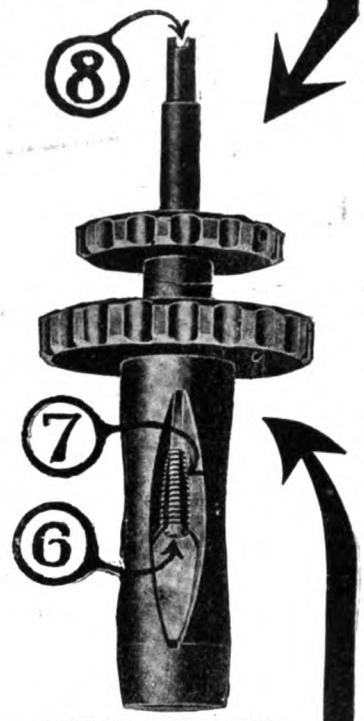
Tire Manufacturers claim that 75% of adjustments are due to under-inflation. Why continue to abuse your pocketbook, when you can remedy this condition by using A & H Valve Tools, they take care of every condition arising from your valves and prevent the annoying slow leaks.

ENDORSED BY ALL THE LEADING TIRE MANUFACTURERS— SUPPLY AND HARDWARE JOBBERS

1. Recut outside stem threads.
2. Take off hexagon nuts.
3. Remove broken plungers.
4. Remove broken plungers.
5. Ream off rough nipples.

With the true threader YOU CAN

6. Recut inside plunger threads.
7. Recut outside nipple threads.
8. Take out plungers.



TRUE THREADER TOOL
(Actual Size)

List $1.50 Each

TRADE PRICES

25% . . . Single Lots
33⅓% . . 12 or More

ORDER FROM YOUR JOBBER

—SOLD BY—

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The Chapin Co., West Calgary.

CALIFORNIA
Chanslor & Lyon Co., and Branches, Los Angeles.
United Auto Supply Co., San Francisco.

COLORADO
The Foster Auto Supply Co., Denver.

INDIANA
Columbia Tire & Supply Co., Lafayette.
W. J. Holliday & Co., Indianapolis.
Universal Accessories Co., Indianapolis.
H. T. Hearsey, Indianapolis.

ILLINOIS
Automobile Supply Co., Chicago.
Chicago Automobile Supply House, Chicago.
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Hine-Watt Mfg. Co., Chicago.
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Shuler Rubber & Supply Co., New Orleans.

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Michigan Tire & Accessory Co., Grand Rapids
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Detroit Tire Co., Detroit.
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Baltimore Hub Wheel & Mfg. Co., Baltimore.

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Motor Car Equipment Co., New York City.
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A & H MANUFACTURING CO., 505-7 WEST 45th STREET, NEW YORK

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A SURE SIGN of carbon is a smoky exhaust, due to lubrication getting *past* the piston rings up into the combustion chambers where it *burns*. Leaky piston rings waste as high as 25% gasoline —one drop in four.

HI-COMP PISTON RING

"THE RING THAT MAKES THE MOTOR SING"

are the best gas-tight rings for overcoming engine troubles due to carbon—knocking, skipping, faulty ignition; valve pitting, wearing down of cylinder walls, piston and piston rings; smoky exhausts.

Hi-Comp Piston Rings are made from two perfectly balanced perfect eccentric rings into one absolutely gas-tight concentric ring. Each ring ground under oil — not buffetted — to preserve the true temper of the secret process gray iron and ensure high polish and gas-tight fit. Won't wear cylinders out of round — *proof* of gas-tightness. Make reboring of average cylinders unnecessary — an exclusive Hi-Comp advantage. Hi-Comp Piston Rings deliver every ounce of power from every drop of gasoline on to the piston head — no power or oil can get past them!

It will pay you to install Hi-Comp because of the satisfaction they give to you and your customers. Fully guaranteed by an old established piston ring company to give MORE POWER on less gasoline and oil. Write for booklet, specification chart and details of 90-day trial guarantee

The Continental Piston Ring Co., Memphis, Tenn.

The Ring that Makes the Motor Sing

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HALLADAY BUMPERS AUTOMOBILE ACCESSORIES

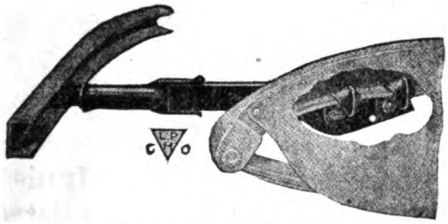
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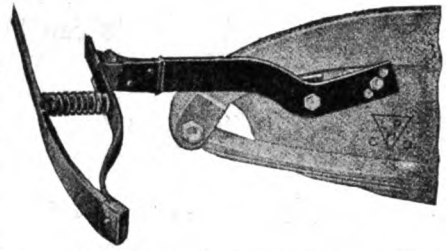
HALLADAY HELPS FOR FORD CARS

HALLADAY

Under Clamp Bumpers

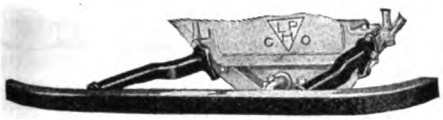
For All Front Extension Frames



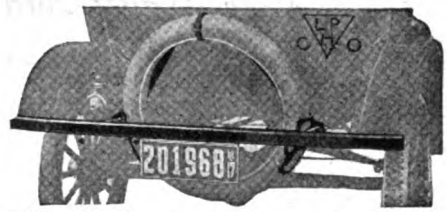


Here is the latest Halladay Bumper, the big business getter of them all as it fits practically every extension frame car built. Like all Halladay equipment it has special features all its own and none of the weak points of others of similar type. We supply it with all the Halladay bars.

There is a HALLADAY Bumper to fit every taste and every car



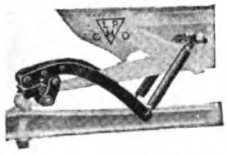
Bumpers for Fords



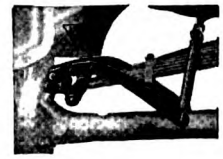
The Halladay front bumper for Ford cars is too well-known to need detailed description. It is built for hard service, is quickly attached and stays put.

The New Halladay Rear Bumper. The strongest and most durable rear bumper ever put on a Ford.

It is supplied with or without the tire carrier, which possesses the usual features of Halladay superiority. The tire is supported by two cradles secured to the bumper arm and is held in vertical position by an arm extending upward from the cradle. There is no attachment to the body anywhere.



FLEXLEVERS

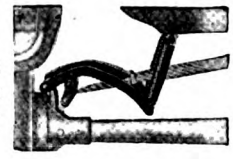


The New Halladay All-Steel Flexlever retains all previous points of supremacy with the additional features of steel spring arms, double springs, and malleable steel bearings, the most durable and efficient bearing ever made to meet the requirements of shock absorber surface. They are supplied in sets of four or in pairs for front or rear.

THIS IS THE ONLY SHOCK ABSORBER OF THIS TYPE FOR FORD CARS THAT CAN BE ATTACHED WITHOUT REMOVAL OF THE REAR WHEELS OR INTERFERENCE WITH THE SPRING PERCHES.



Double Arm Shock Absorbers



The Halladay Double Arm Shock Absorbers now possess all the valuable features of the Flexlevers except that of quick installing and may be applied as quickly and easily as any other shock absorber for Ford cars, except the Flexlever.

We also make the Halladay Tilting Steering Wheel for Fords, Halladay Can Tippers and other Ford Accessories. Live dealers find the line a profitable one. Why not You? Our catalog is full of good things. Write for it Now.

L. P. HALLADAY, Streator, Illinois

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REMOVAL SALE

In order to save moving material to new and larger quarters, I offer the following new material at much reduced prices:

Westinghouse #209R Generators, 6 Volt., complete with Regulator	$20.00	Each
Hartford Shock Absorbers, per set of 4	12.00	"
Eisemann 6 Cyl. Magnetos, Automatic Advance, Clockwise Rotation	37.50	"
6 Cylinder Motors (Unit Power Plant) 3½x5	165.00	"
Warner Transmissions with Clutch and Lever for above Motor, complete,	40.00	"
Bosch 2 Spark 4 and 6 Cylinder Magnetos	65.00	"
Timken Bearings #315	1.80	"
" " #365	2.25	"
" " #418 can be used to replace #415	2.70	"
" " #444 " " " #440	2.80	"
Annular " #219 assorted makes	15.00	"
" " #314 " "	12.00	"
" " #316 " "	17.00	"

I also have a large stock of other bearings and other material such as Lamps, Ignition Sets, Magnetos, Wire, Steering Gears, Axles, etc. Send for complete list.

S. BREAKSTONE, 1526 Wabash Ave., CHICAGO

After August 20th, 1918, at 1322-26 MICHIGAN AVENUE

IT is all very well to have decided opinions—that is a token of mental strength—but to blind your eyes to the opposite viewpoint is a sign of a narrow mind. The man who cannot see the other fellow's side of the story as well as his own is the one whom progress leaves behind. The man who is unalterably convinced that his opinion is the only right one is outstripped in the climb to success by his opponent who sees both sides of the question.

OUR CUSTOMERS TELL US THAT THE

Automobile Dealer and Repairer

is the "best little trade puller of them all."



If you do not know that this is really so—isn't it about time you found out?

WINTER EQUIPMENT MANUFACTURERS,

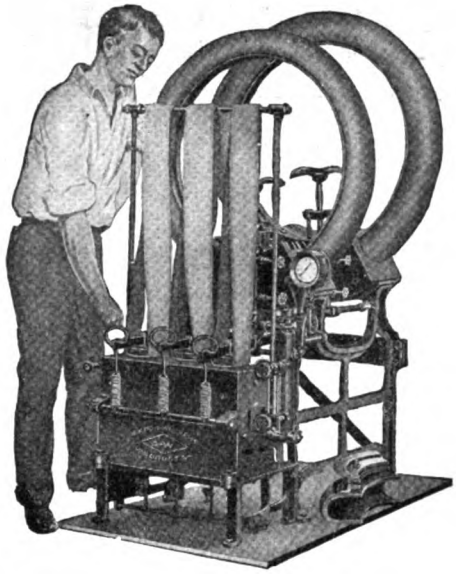
makers of heaters, radiator covers, anti-freeze solutions, enclosed bodies, steering wheel warmers, etc., ought to start NOW to advertise their products.

Get your ad in the SEPTEMBER NUMBER (30,000 copies) | FORMS CLOSE SEPT. 6th, 1918 WRITE OR WIRE

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Wartime economy and the rising prices of new tires are compelling car owners to keep their tires and tubes repaired over and over again to give the utmost mileage. Tire repairing, like motoring, goes on all during the year.

Get on the *Profit Side* of present conditions by starting a tire repair business with

Akron-Williams

TIRE REPAIR EQUIPMENT

Designed and Perfected by the Foremost Tire Engineers. Used and Sold by Over One Hundred Leading Tire Companies

You Can Start in a Small Way with small capital and add equipment as your business grows. There's an Akron-Williams outfit for every size shop and a machine or tool for every purpose in tire and tube repairing. No equipment is too large for us—no tools too small.

Complete Instructions in All Branches of tire and tube repairing is arranged for Akron-Williams users, under the personal direction of experts in the big tire factories —and we help you locate where opportunities are Best.

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"They were soldiers lost in the desert, half dead and starved—found sittin' on their packs, that were full of food! Here you're wailin' about no Fords, merchants waitin' for trucks and you 'sit on your pack', watchin' joy ridin' Fords go by the hundreds."

"What good'll they do me, Jim?"

"Get out and get 'em. Put a Hay-Dee Extension on the chassis an' you'll get 115 to 130 inch wheel base; you'll have a truck that has 8 to 9 feet of loadin' space; that'll haul from 500 to 2000 lbs.; you'll give the merchant a dandy truck, with a body complete at less than $800; you'll get a four-time profit on the whole deal; you'll make friends and new business every day—say, what more d'y' want?"

"Hully gee, Al, where did you get that stuff?"

"You write Hayes & Diefenderfer. They'll show you something that'll open your eyes. You'll get a pep and punch in your sales! That's what you need. Go to it and don't wait. Write 'em today!"

HAY-DEE EXTENSIONS *for* FORD *cars*

$55 *A Business Builder for Live Dealers* **$60**

The only attachment for a Ford making a Truck and re-convertible to a pleasure car at any time. Not a cut or hole to make. Anyone can put it on with a wrench.

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D & B CARBURETOR

Built For The Job

SPRINGLESS, SIMPLE AND EFFICIENT

Gasoline vapor measured and mixed with mechanical accuracy and nothing left to springs or other weak construction.

No change in controls or manifolds.



Price with Auxiliary Air Control $10.00

DESIGNED, DEVELOPED AND PERFECTED

for the Ford motor, with no delicate adjustments left for the inexperienced user to generally get wrong.

Easily installed by anyone.

YOUR CAR CAN BE ONLY AS GOOD AS YOUR CARBURETOR

You will never appreciate the full Power, Service and Economy of a Ford car till you use a **D & B Carburetor** with auxiliary air control which insures instant start and sure get-away with a cold motor and the utmost economy and efficiency with a warm one.

Pays for itself in gasoline saved and earns many times its cost in the increased motor efficiency.

Sold through regular channels, but if your dealer does not carry the **D & B** we will ship, charges prepaid, on receipt of Price, $10.00.

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Price $3.82, Prepaid, Express.

How to Become an Expert Automobile Mechanician

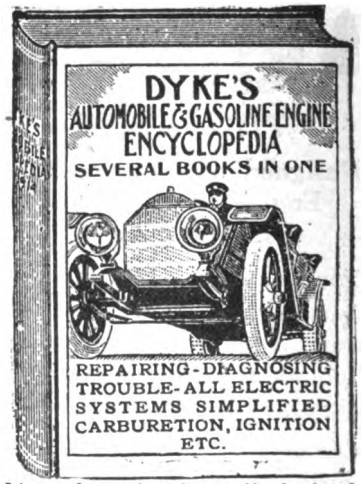
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Don't Wait Until Afterwards

Auto Smash! 3 Killed, 2 Fatally Injured. Due to Mistaken Signals.

This happens every day.

When will your turn come?

Prevent the accident by providing your car NOW with the

SMITH AUTO SIGNAL

It eliminates hand-signaling and tells definitely, positively and unmistakably what you are going to do. The burden of proof is then on the "other fellow." Don't wait until afterwards.

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(Representatives wanted)



REAR VIEW

Note how Smith Auto Signal shows to front and traffic policeman as well as to rear.

STOP
Selling Weak Springs

Don't sell your customers springs that break. Sell the one spring that never breaks—the spring with the extra guarantee.

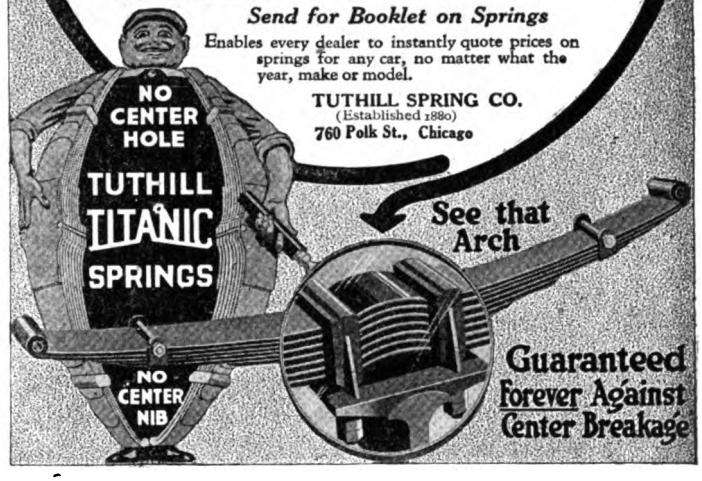
GUARANTEED TUTHILL TITANIC SPRINGS LUBRICATED

are guaranteed at all points and in every respect for one year and in addition are guaranteed *forever* against center breakage, where 3 out of 4 old fashioned springs break.

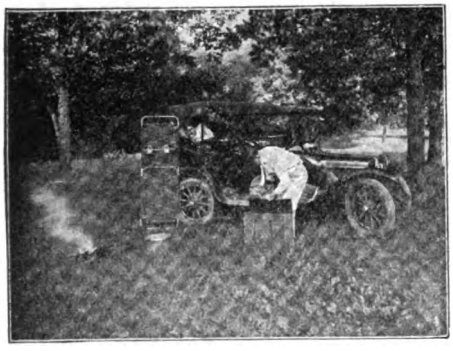
Send for Booklet on Springs

Enables every dealer to instantly quote prices on springs for any car, no matter what the year, make or model.

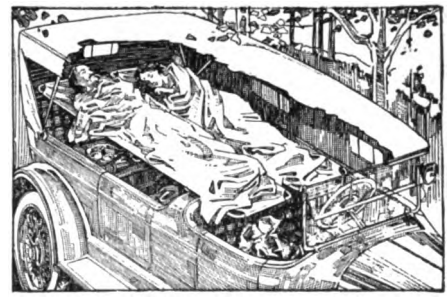
TUTHILL SPRING CO.
(Established 1880)
760 Polk St., Chicago



A KOT THAT FITS ANY AUTOMOBILE



The Any-Kar Auto Kot is the simplest, most inexpensive, and comfortable sleeping bed, that rests over the tops of the rear and front seats. One or two of these kots will fit into any five or seven passenger car. Special size for Fords. The kot is furnished with a heavy ducking and folds to a small package and can be carried while touring the same as a grip.



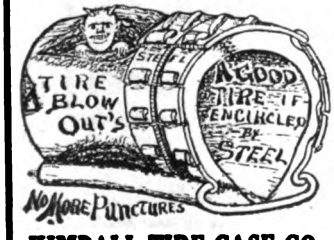
Price $12.00, f. o. b. Peoria

Manufactured by the

PEORIA AUTO KOT COMPANY,
PEORIA, ILL.

Hang on to your old tires. They will last as long as you live if covered with steel. **The Kimball Steel Protector** makes **Blowouts, Punctures** and **Rim Cuts impossible.** A few sections will hold any old blowout. Tires as flexible as ever.

Special inducements to those in new territory.







MUD CHAIN can be put on in a jiffy with one hand while standing on the run board. If you get in a mud hole you will laugh out loud. Hook the ends together and pull the little lever and they are on tight. Good for blowouts.

KIMBALL TIRE CASE CO., 174 Broadway, Council Bluffs, Iowa

B-W DIRECT CURRENT



STURDILY CONSTRUCTED to retain accuracy under the most severe conditions. Handsome in appearance. Made in both flush and surface types. Finished in bright nickel or black rubberoid as desired.

Better Ammeters Cannot Be Purchased, PRICE..... $1.90

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AMMETERS

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BUILD UP BIG BUSINESS-MAKE BIG MONEY

Open a tire repairing shop, the great money making business of the age. Work will pour in. Men starting without experience—now making big money. We instruct you free. Outfit pays for itself. We have 1,000 more vacancies to fill. Golden opportunity.

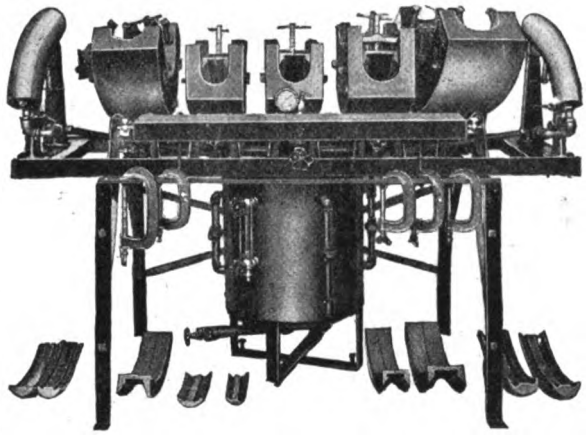


Illustration shows Vanderpool 5 cavity model that does every kind of repairing—($100.00 worth a day). Also made in 2 and 3 cavity (smaller) sizes.

Price of new tires going up so high, car owners MUST have old tires repaired. But be sure—get the RIGHT Outfit. There is but one that operates upon CORRECT principle—the

VANDERPOOL VULCANIZER

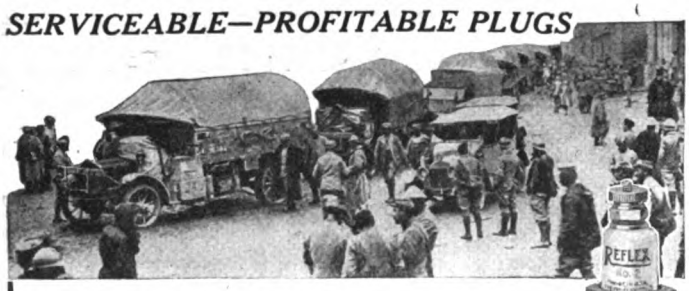
Only vulcanizer recommended by leading Tire factories because the only one that repairs tires EXACTLY AS THEY WERE MADE. The VANDERPOOL is the vulcanizer now bought by VETERAN Tire Repairers after trying other makes and DISCARDING them. Cheapest of all to operate. Write for Free Book of instructions. Tells everything. Testimonials from Vanderpool users now making big money. Get into business for yourself. Be independent!

In answering, address Dept. B

The Vanderpool Co., Springfield, Ohio

Don't Have the Constant Fear of Losing Your Job

SERVICEABLE—PROFITABLE PLUGS





Why not sell plugs that will give your customers service—and net you a good profit! You make certain of both if you sell

REFLEX SPARK PLUGS



Keep the Car on the Go

REFLEX equipped White Trucks on transport duty in the war zone.

Reflex Spark Plugs "Keep the car on the go" because they are built of materials that are standing up under the severe usage of trucks in transportation and war zone service.

You get an exceptional profit. You deal in an established line. Write today concerning *your* territory.

THE REFLEX IGNITION COMPANY
1711 Payne Avenue Cleveland, U. S. A.

It Pays to Advertise

IN THE

Automobile Dealer and Repairer

Write for Advertising Rates

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Have You Had Trouble With Your Tires?

The fault is not with the tires. You, or your chauffeur, or both, are to blame. The responsibility is yours because you should keep the tires pumped up to a specified pressure, and don't.

Tires that are kept up to the proper air pressure last twice as long—sometimes ten times longer—than tires that are run with not enough air in them. Measure your air daily with a

SCHRADER UNIVERSAL TIRE PRESSURE GAUGE

and get out of your tires all the miles they can give.

Price in U. S. A. **$1.25**

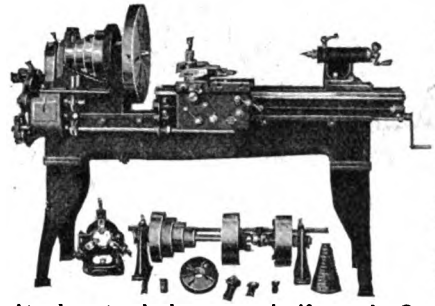
At your dealer or

A. SCHRADER'S SON, Inc.
783-803 Atlantic Avenue, Brooklyn, N. Y.



THE UNIVERSAL GARAGE LATHE

Is our 14-24" Sliding Extension Gap Lathe
JUST THE THING FOR GARAGES AND REPAIR SHOPS



Saves investing in a large expensive lathe. Swings 14½ in. over top bed, and 24-in. through gap. The 7½ ft. machine takes 8 ft. between centers.

Cuts right or left-hand threads, and can be furnished with transposing gears for millimeter threads.

Machine is strong, rigid and accurate, has 2⅛ in. spindle with 1⅝ in. hole through same. There are six quick change geared feeds and other new features. Great range and value at a reasonable price.

Taper Attachment, Milling Attachment and other accessories if wanted. *Send for bulletins and prices.*

BARNES DRILL COMPANY Incorporated 1907
818 CHESTNUT STREET - - - - - ROCKFORD, ILL.
Builders of the ALL-GEARED DRILL



PISTONS FOR THE FORD

Made of a Close Grained GRAY IRON. Perfectly ROUND AND GROUND TO SIZE.

Fitted with PINS, BRONZE BUSHINGS AND STEP CUT RINGS.

ASK YOUR JOBBER FOR THE DYER
Quality Pistons, or Order Direct.

WE HAVE SEVERAL HUNDRED PATTERNS OF PISTONS FOR DIFFERENT MODELS OF ENGINES.

THE G. H. DYER COMPANY, Cambridge, Mass



SERVICE STATIONS WANTED

WE ARE THE ORIGINATORS OF THE SERVICE STATION PLAN WHICH PUT THE CONTACT AND BRUSH REPAIR BUSINESS ON A SYSTEMATIC PAYING BASIS. WRITE FOR CONTRACT AND GET ONE OF OUR CASH REGISTERS OF CONTACT PARTS FREE IF YOU DO ANY MAGNETO REPAIRING YOU WILL NEED THE DEFECTOMETER FOR ACCURACY IN LOCATING MAGNETO SHORTS. IT QUICKLY PAYS FOR ITSELF.

PAUL G. NIEHOFF & CO. INC 232-242 E. OHIO ST. CHICAGO, U.S.A.
METALLURGICAL AND ELECTRICAL LABORATORIES

ATTENTION

We wish to ANNOUNCE that we now do all kinds of expert armature rewinding

♥QUICK SERVICE♥

At Our Risk-You Can Prove it.

DON'T waste good money on tire pumps that either break your back, or pump *Rubber Rotting* oil particles or gasoline fumes into your tires.

TAKE NO CHANCES

At our risk you can prove that the "DEAD EASY" is quicker, safer, easier and cheaper than any other tire pump, either engine drive or hand power.

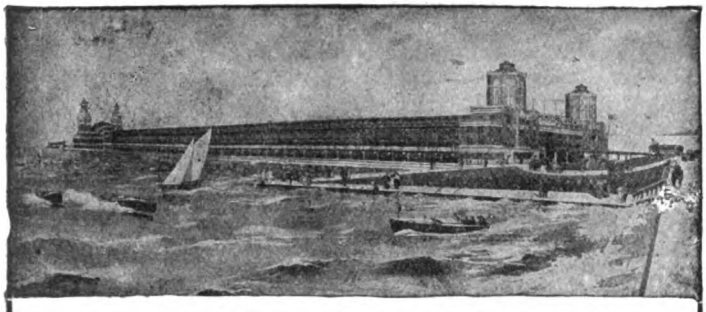
Convenient to carry with any car, it is always ready for instant service. The gauge showing exact tire pressure, there is no guesswork—and it's "DEAD EASY."

Free Trial Offer

Write Today, NOW, for Fifteen-Day—No-Money-in-Advance—Free Trial Offer.

GLOBE MFG. CO., BATTLE CREEK, MICH., U.S.A.

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MUNICIPAL PIER
CHICAGO

Scene of the
NATIONAL TRUCK,
TRACTOR AND ACCESSORIES
EXPOSITION

September 14th to 21st, 1918

TRUCKS—

This will be America's most representative war-time truck show—embracing the giants of transcontinental fame and the little local delivery hustlers. Trucks are in the lime-light because of their great service at the front and at home—and all the best trucks will be shown at the Municipal Pier from September 14 to 21.

TRACTORS—

Greatest ally of the Allies—all the giants of the farm and battlefield on display. Small tractors, large tractors—America's representative tractor manufacturers will participate in this great exposition—Municipal Pier, Chicago, September 14 to 21, 1918—a stimulant to the broader agriculture necessary to meet war-time needs.

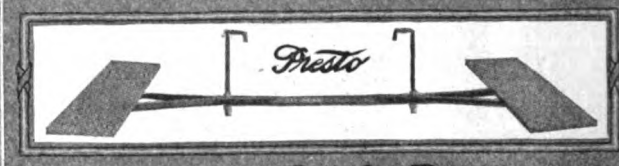
ACCESSORIES—

A big part in war-time conservation is being played by automobile accessories which increase efficiency—mileage and service—and decrease cost of upkeep and operation. The accessories shown at The Pier, September 14 to 21, will bring home to everyone the tremendous strides which American manufacturers have made toward helping to win the war.

DIRECTION OF
AUTOMOTIVE & ACCESSORIES EXPOSITION, Inc.
HOTEL NEW SOUTHERN
13th and Michigan CHICAGO

A.&A.E. INC 1918

The New
Presto Necessity



Presto Body Brace
and Running Board Support *for* Fords

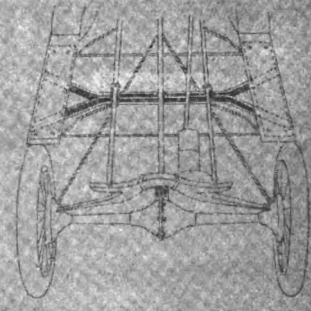
THE **Presto** Brace—strong as a bull because built scientifically like a trussed steel structure—read these ten important reasons why it is a real necessity for Ford Cars.

Stops vibration.
Avoids sagging of running boards and
Prevents their breaking away from fenders.
Prevents broken springs.
Prevents side swaying.
Prevents uneven strain.
Holds drive-shaft in position.
Holds all mechanical parts in alignment.
Equalizes spring action.
Easily installed; no holes to drill, no mechanic necessary.

Once used, it is practically indispensable because it enables you to carry 800 pounds on either running board if necessary without injury to your car. Dealers are amazed at the unprecedented success with which the Presto Brace is meeting.

Price only $3.50 in U. S. A., except west of the Rockies, $4.00. In Canada, $6.00. Satisfaction guaranteed. Order from your jobber, or write direct to us, if he cannot supply you.

DEALERS—Here's a new one that's getting over big. Write and ask us about it. **Satisfactory discounts.** Write for literature and cuts of all new products. Presto products mean bigger profits through increased sales.



METAL SPECIALTIES M'F'G. CO.
338-352 N. Kedzie Ave. Chicago
Eastern Branch—16-24 West 61st St. New York City
Western Branch—149 New Montgomery St. San Francisco

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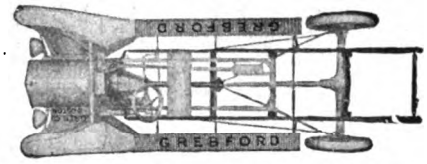
GREB

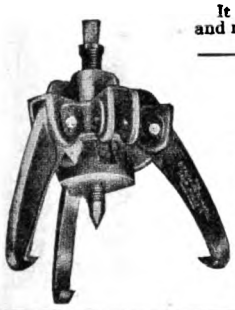
Automobile Accessories and Garage Tools

GREBFORD EXTENSION FOR FORDS

The Grebford *Unit* will lengthen Ford cars in an hour's time. Wheel bases 112, 115, 118, 124, 130 and 136 inches. Capacity 1,000 to 1,800 lbs..

It is not necessary to even cut or disturb the Ford frame. Shipped all assembled and ready to be instantly installed. Write us today for full particulars.





BEACH AUTOMATIC GRIP PULLER

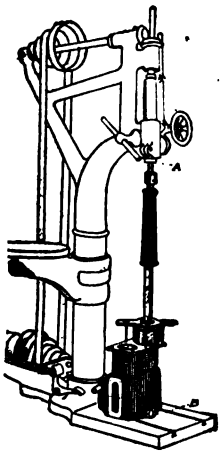
Quick, Strong, Durable, Efficient and Simple. Can be locked in any desired position. Positive grip, cannot unhook, and adjusts to work instantly. Three long arms are also furnished, (12 in. from bell crank to hook which open to 18 in.) Flat end screw. Gilt edge guarantee of highest possible quality and insures extreme satisfaction to the users.

BEACH UNIVERSAL RIM TOOL

It opens the rim ¼ inch. It raises one end two inches and carries it over and by the other four inches, thereby contracing the rim. It swings by center and the spring of the rim holds and locks it in the contracted position, so that the tire may be removed. After the tire has been repaired and replaced simply reverse the operation and the rim is forced back to its correct position. It actually contracts and holds the rim, then expands and locks it in its true position in one operation without removing or changing the position of the clamps.



THE GREB COMPANY, 197 STATE STREET, BOSTON, MASS.



STORM

MOTOR REPAIR EQUIPMENT

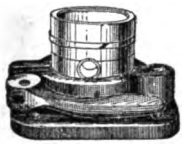
Are Making Big Profits for Thousands of Automobile Shops.

STORM CYLINDER REBORING MACHINES

are most practical for any make of motor. SIMPLE, SPEEDY, ACCURATE and RELIABLE for hand or power. No shop complete without one. In daily use in all parts of U. S. A. and foreign countries.

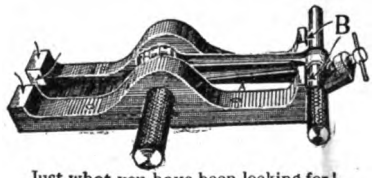
We furnish machines of varied capacities to suit your requirements. Also special machine for Ford and Dodge.

THE STORM PISTON VISE



Holds the Pistons firmly while repairing or replacing bushings, pins, rings and rod. Saves time and prevents damage.

THE STORM CONNECTING ROD BEARING REAMER, JIG AND STRAIGHTENING GAUGE.



Just what you have been looking for! Makes accurate fitting bearings and insures perfect alignment.

For Sale By Leading Jobbers. Write for Catalog.

STORM MFG CO.

Dept. A26 THOMPSON, IOWA

SERVICE STATIONS AND GARAGE MEN

everywhere are buying our Spark Coils and Resistance Units for replacement on all battery ignition equipped cars.

Unusually Efficient, with Brackets to Fit on All Cars

They Bring Business, Save Time, and Net You Splendid Profit

Dealers' prices and circulars showing proper model for each car on request.



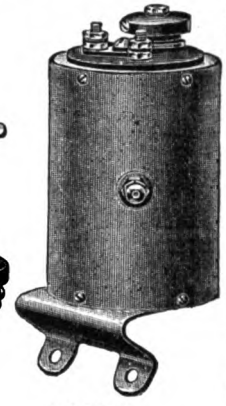
TYPE D



STYLE A



STYLE D



TYPE F

NEW YORK COIL COMPANY

338 Pearl Street, New York City

Western Distributor: Gray-Heath Co., 1440 Michigan Ave., Chicago, Ill.



METAL HOSE AND TUBING CO., BROOKLYN, N.Y.

Write to Dept. C-3 for Illustrated Matter and Prices.

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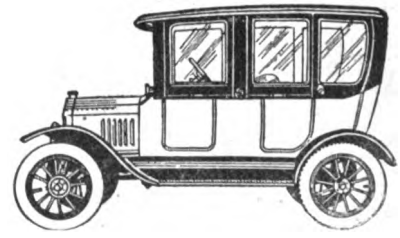
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DETROIT DETACHABLE WEATHERPROOF TOP

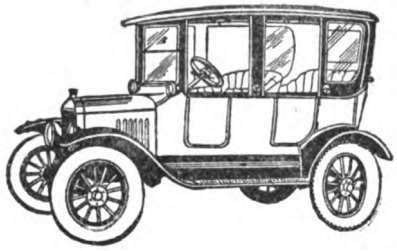
Storm Tight—Wind Proof—Dust Repellent

ELIMINATES instantly all the Ford drivers' former hardships—no bothersome side curtains to adjust in the biting cold or blinding snowstorm. No change made in the standard body. Entire top can be attached by anyone in a few hours.



It is the only patented all-weather top that does away with the objectionable features of a detachable top and affords the car owner an enclosed or open body for year-round use at a really low price.

It is absolutely rattle proof and will last as long as the car.



Just One of the Exclusive Features
of this convertible type top is the patented flexible, easy sliding doors, which disappear into the roof and increase the size of regular Ford doors 3 inches.
For the other 9 big improvements, see our literature—write us today.

DETROIT WEATHERPROOF BODY CO., Saginaw St., Pontiac, Michigan

SHARRER PATENT TOP CO.

2 doors West of Broadway 239 West 56th St., New York City Telephone, Circle 1636

Wholesale and Retail Distributors in Eastern New York, Connecticut and Northern New Jersey for Detroit Weatherproof Body Company's All-Season Demountable Tops.

Especially constructed for: Hudson - Chalmers—Chandler—Buick—Overland—Maxwell—Chevrolet—Ford

A Fine Fall and Winter Proposition for Dealers

BLACK & DECKER

LECTROFLATER

ELECTRIC AIR COMPRESSORS

GIVE CLEAN PURE AIR QUICKLY!

RAIN OR SHINE—IN THE GARAGE,
ON THE CURB—IN THE STREET—ANYWHERE

The Lectroflator can be filled by simply attaching the electric cord connection (4) to a convenient electric light socket.

Automatic Pressure Switch (2) starts the compressor refilling the tank when the pressure drops to 130 pounds and cuts out when 150 pounds pressure is reached. The large accurate gauge (5) indicates the tank pressure at all times.

The Lectroflater is always ready with a load to fill ten average tires at a cost of 1/10 of a cent each in current.

The Pump itself is lubricated with grease—not oil (1) which means there's no oil level to maintain, and it's air cooled by forced draught so there's no liquid to freeze or evaporate.

All working parts housed and protected against dirt, grit, and rough handling. The tank (3) is welded and brazed in all seams and is tested to 300 pounds hydraulic pressure.

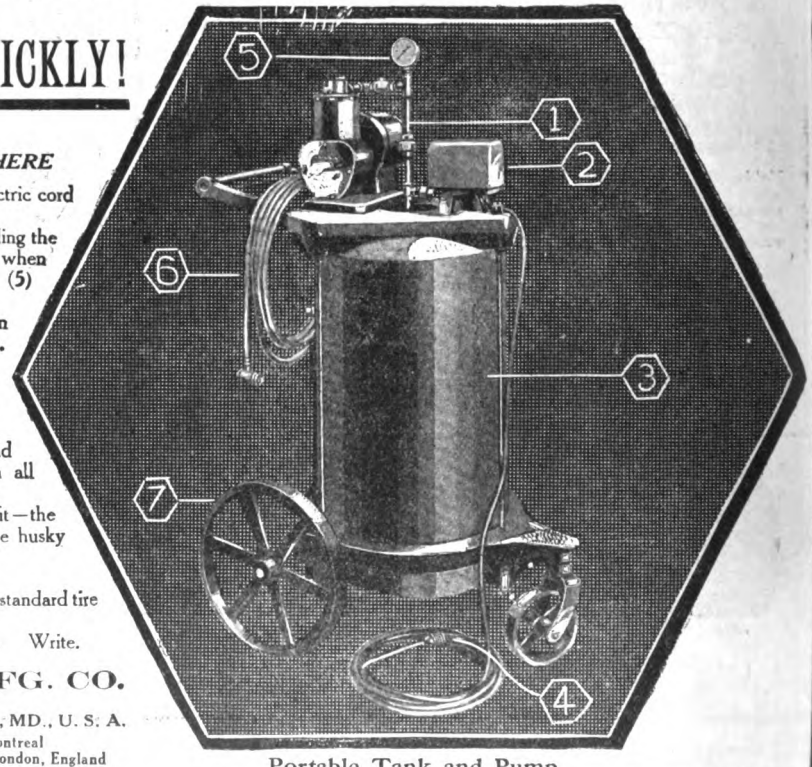
It's handsome—this Lectroflater Pump and Tank Outfit—the finish is green and black enamel with nickel trimmings. Large husky metal wheels (7) are furnished for hard service.

Twenty-five feet of high pressure hose (6) fitted with standard tire chuck—goes with each outfit.

Catalogue, electrotypes and mailing literature available. Write.

THE BLACK & DECKER MFG. CO.
Makers of B & D Portable Electric Drills
SOUTH CALVERT STREET, BALTIMORE, MD., U. S. A.

Distributors in Canada: Northern Electric Company, Ltd., Montreal
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Portable Tank and Pump

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$25 Worth of tools for $16.00

—a complete repair outfit in itself—arranged in just about the most convenient manner you can imagine. Everything you need and everything in its right place.

The Stewart Handy Worker is a wonderful combination of tools (six in one). Outfit includes strong practical anvil; powerful vise up to 4¼ inches; a sure-grip steel pipe vise; corundum grinding wheel, 5 inches by 1 inch; a two-speed drill press, with 2 drills; a metal cutting wedge and driving mechanism of three speeds—direct, 4 to 1 and 16 to 1—easily regulated by changing handle grip. It operates grinding wheel, buffing wheel and many other similar tools. All for $16.

Send $2 with order for one these outfits, pay balance on arrival. If not satisfactory in every way, return it and money will be refunded.

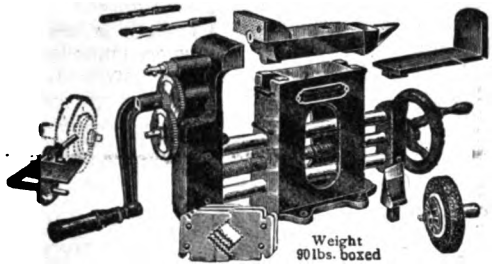
Every Private Garage Should Have One.

Every Public Garage Needs at *Least* One.

Descriptive Booklet Mailed on Request

CHICAGO FLEXIBLE SHAFT CO.
Dept. M, 12th St. & Central Ave., Chicago

Stewart Handy Worker



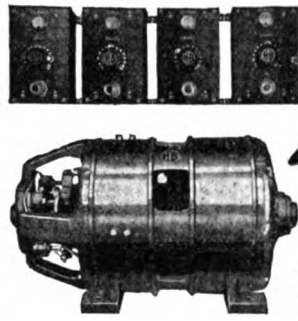
BATTERY CHARGING PAYS BIG PROFITS

HB

This new 32 battery equipment is designed especially for garages and battery service stations where large capacity is required to meet the ever increasing demand for battery charging. Amply designed 5 H. P. motor operates from city current, charging 32 6-volt batteries or equivalent at one time. Four separate charging lines and panels permit individual attention to every battery.

Bigger capacity means *lower operating* cost and *bigger profits*. It is wise, therefore, to figure ahead and install equipment with capacity to meet future requirements. Write at once for full information and terms under which outfit should easily *pay for itself* while you use it.

32 Battery Capacity Charger



Shipped Under a Guarantee of *Absolute Satisfaction* or Money Refunded.

YOU RUN NO RISK

We furnish also smaller capacity outfits or belt drive where city current is not available.

Write for full information.

HOBART BROTHERS COMPANY
Box D8 TROY, OHIO

Install a Curtis Air Compressor



Display a CURTIS "FREE AIR" SIGN above your door—it inspires confidence and will help build your business. Motorists are looking for this familiar CURTIS slogan—because they know oil rots tires—and that a CURTIS Air Compressor furnishes AIR FREE FROM OIL, which means fewer blowouts, greater tire mileage and less repairs. The CURTIS is the ONLY Garage Air Compressor with the controlled splash oiling system that eliminates all danger of forcing oil into the air line.

CURTIS AIR FREE FROM OIL

Investigate the many exclusive features of CURTIS Garage Air Compressors. The line is complete—five sizes—stationary or portable. Just write your name and address on the margin of this advertisement—tear it out and send it to your jobber, or to us direct, for complete information and prices.

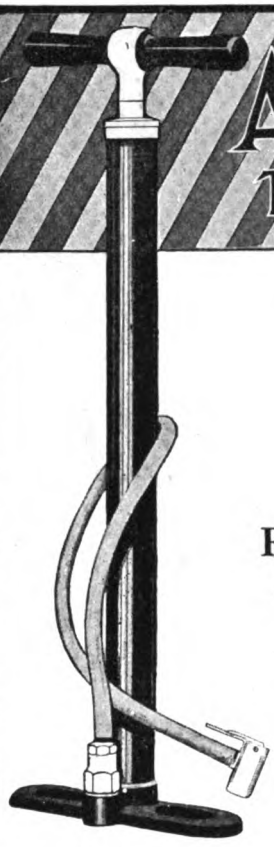
Curtis Pneumatic Machinery Co.
1530 Kienlen Ave., St. Louis, Mo.
Branch Office—530-E Hudson Terminal, New York City



The Curtis Sign

Illustrated above—is 10x14 inches—baked enamel on steel. Cannot be bought, but is furnished FREE with every CURTIS Garage Air Compressor—and cannot be had in any other way.

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THE ANTHONY TIRE PUMP

SIMPLE
POWERFUL
EFFICIENT

A
REMARKABLE
ACCESSORY

EXAMINE IT
AND YOU WILL
BUY IT

The Anthony Company, Long Island City, New York

USE KEROSENE

DRIVE YOUR CAR TWICE AS FAR AND BUY YOUR FUEL FOR LESS THAN HALF.

OFFICIAL TEST
DETROIT AUTOMOBILE CLUB
June 4, 1918.

UNDER instruction of Mr. W. S. Gilbreath, manager of the club, I acted as observer of a test run made with your Kerosene Equipment on June 3rd.

The equipment in question was attached to a 1914 Model T Ford, which was not in the best mechanical condition at the time.

One and one-fourth gallons of Kerosene were consumed in the test, a distance of 37 7-10 miles being traversed, much of this on ordinary country roads. About eighteen miles of the trip was through fairly heavy traffic. A speed of 22 miles per hour was maintained.

Performance of the car was equal to, if not better than could have been done on other types of fuel.

DETROIT AUTOMOBILE CLUB,
E. W. SULLIVAN, Observer.

BUY NOW

Order direct from this advertisement. Enclose purchase price, $25 for complete Equipment on 30 days trial.

If you find it doesn't do all that you expect—if you think it isn't an *immense money saver*—return it within a month from date shipped, and get your money back. No risk. Send order today on *25 miles minimum per gallon kerosene Guaranteed.*

C. O. D. orders must be accompanied with $5.00 payment.

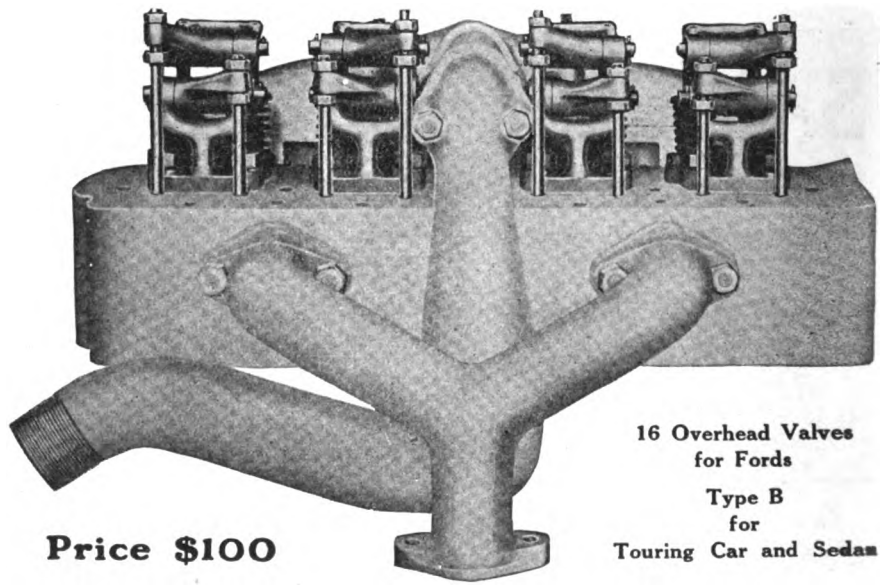
A USER SAYS: "We have certainly gotten some positively wonderful results out of this carburetor and would not go back to straight gas on a bet." "THE HUNTLEY," Winona, Minn., May 23, 1918.

Free Descriptive Circular for the Asking
Some Sales Territory Still Open

KEROSENE EQUIPMENT CO.
393 KRESGE BUILDING, -:- DETROIT

Make Your Ford a $3,000 Car from the Standpoint of Motor Service.

Intake side type B, the latest Roof 16 valve design for Ford touring cars. Exhaust and manifold operate on same side. Note how intake is heated by exhaust manifold, both manifolds being in contact with each other at the division point on the intake, giving all the advantage of hot spot manifolds. Note the simplicity of the design, how easy it can be installed, and that threaded end of exhaust manifold can be connected with regular Ford exhaust pipe.



16 Overhead Valves for Fords

Type B for Touring Car and Sedan

Price $100

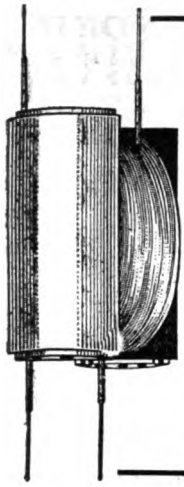
SPEED POWER ECONOMY

Speed to climb the steepest hills as you never dreamed of before. Power to double the value of your converted Ford truck, the load carrying capacity of which is only limited to the strength of the rear axle. Speed for the road or for the track to rival the high cost racing cars. A long list of racing car drivers, winners of speed contests, show what you can look for if you want a snappy speedster or a race track winner. Special equipment for touring car, truck and racing car for $100.00. Extra racing equipment at special low prices. Get our quotations on high speed cam shaft, gray iron pistons, aluminite connecting rods, Lynite pistons and rings complete, counter-balances for crank shaft, nickel steel racing gears 3 to 1 ratio, special oiling systems, fast carburetors and beautifully designed racing bodies. Every Ford owner a likely prospect and every Ford converted truck owner a sure sale. An absolute necessity to every owner of a fast Ford.

DEALERS: Get our distributing terms and quotations on the greatest selling specialty in America. Write today.

LAUREL MOTORS CORPORATION, ANDERSON, INDIANA
Made in the "Puncture Proof" City

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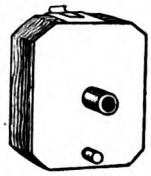


OUR HIGH TENSION

Windings and Condensers

are fully guaranteed and equal if not superior in every detail to those of the orginal manufacture, as we make a specialty of rewinding Armatures and Coils for all makes of Magnetos.

These departments we have greatly enlarged—which is the best proof that we satisfy our customers.



Special Attention to Dealers and Magneto Repairmen

Write to us for Details

MAGNETO WINDING COMPANY

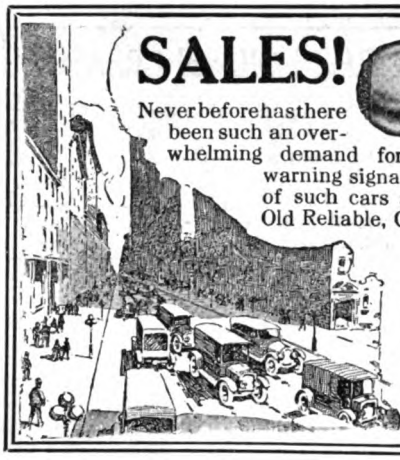
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SALES!



Never before has there been such an overwhelming demand for an automobile warning signal. Manufacturers of such cars as Pierce Arrow, Old Reliable, Columbia, Selden, Little Giant, White and 24 others specify the Buell Explosion Whistle as standard or optional equipment. And hundreds of motor car and truck owners are buying the Buell every day. Write at once for dealer discounts.



BUELL MFG. COMPANY

1612 Michigan Blvd.. Chicago

Shurnuff

TRADE MARK

Necessities for Ford Cars

Shurnuff Grease Retainers: Price per pair, 90c; Canada, $1.35.

Shurnuff Running Board Fender Support: Price per pair, $4.50; west of Rockies, $4.75; in Canada, $6.75.

Shurnuff Combination Manifold: Price, $9.00; west of Rockies, $10.00; in Canada, $12.50.

Shurnuff Windshield Ventilator: Price $7.50; west of Rockies, $7.75; in Canada, $11.25.

Write for full particulars and illustrated descriptive literature. A profitable line for *you.*

SHURNUFF MFG. CO., Dept. *D,* **St. Louis, Mo.**

Sales Dept., THE ZINKE CO., Chicago, Ill.

MELLIN'S



ADJUSTABLE GEAR SHIFT EXTENSION LEVERS

Will Fit All Cars

(PATENTED)

Over 20,000 in Use



DODGE, OVERLAND "75" and "90," and NASH - - List, $1.25

BUICK, REO, OAKLAND, and all cars having a removable ball on the top of shift lever - - - - - - - - List, $1.50

HUDSON SUPER SIX, OVERLAND "85" and all cars having a solid lever, where the ball is not removable and the extension must be clamped on - - - - - - - - List, $2.00

ALL GOODS SHIPPED PREPAID

WHEN ORDERING GIVE NAME AND MODEL OF YOUR CAR

AT YOUR **Jobber's** *OR WRITE*

M. & H. NOVELTY CO., 857 E. 24th St., Los Angeles, Cal.

The Ring With the Spring

SAVE OIL AND GAS

PATENTED MAR. 2, '16; FEB. 29, '16

by installing Pressure Proof Piston Rings in your motor. These rings are so mechanically correct that oil and compression cannot leak by the piston all the fuel is burned, and your motor's consumption of oil and gasoline is reduced to a minimum. With

PRESSURE PROOF PISTON RINGS

carbon is permanently eliminated, and the original power and "pep" of your motor is completely restored.

PRESSURE PROOF PISTON RING CO.

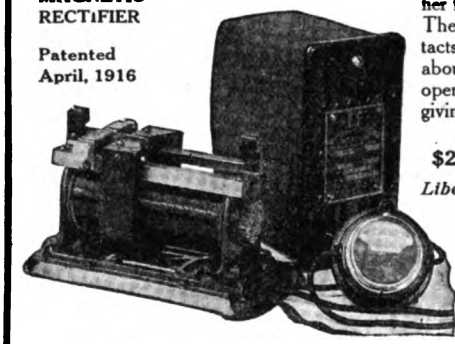
169 Massachusetts Ave., Boston, Mass.

The Spring's the Thing

F-F BATTERY BOOSTER

MAGNETIC RECTIFIER

Patented April, 1916



A full wave magnetic rectifier for public or private use. The copper and carbon contacts cannot stick. Costs about ½ cent per hour to operate. Thousands in use giving satisfactory service.

Sells at

$24 and up, complete

Liberal Discount to Dealers

Also F. F. Charging Rheostats for use on D. C. current.

Write for Bulletin No. 10

The France Mfg. Co.

Cleveland, Ohio

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VULCAN QUALITY

AUTOMOBILE SPRINGS

SPRINGS IN STOCK FOR ALL CARS

90,000 Springs. 588 Types.

6—FACTORY BRANCHES—6

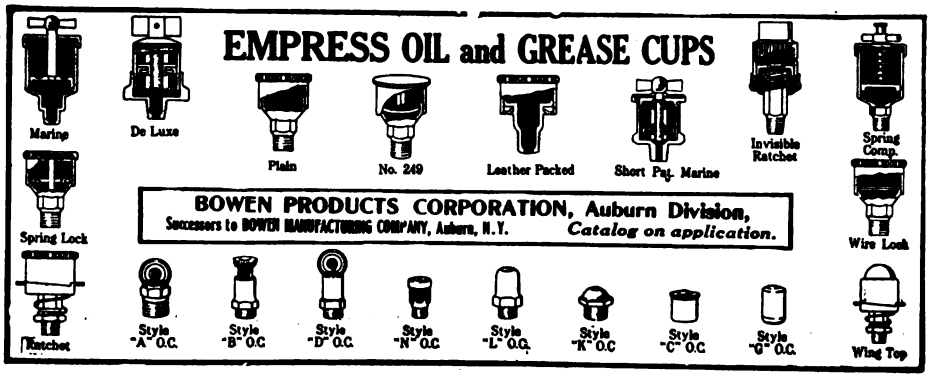
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FACTORY RICHMOND, IND.

JENKINS VULCAN SPRING CO.

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EMPRESS OIL and GREASE CUPS



BOWEN PRODUCTS CORPORATION, Auburn Division,
Successors to BOWEN MANUFACTURING COMPANY, Auburn, N.Y. *Catalog on application.*

THE DEFENDER



Sells for $4.00
Worth the price of car

Is the "Standard" Ford Ignition Lock. Always demand the Defender and take no imitations. The Defender safely locks the coil box, and is the only lock that grounds the electrical system; this makes them thief proof. Insurance Companies require the Defender and allow 15% off on Insurance.

DEFENDER AUTO LOCK CO.
DETROIT, MICHIGAN

GET ANOTHER 5000 MILES OUT OF YOUR OLD TIRES

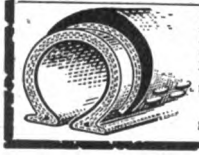
Stop throwing away your money!

Save your old tires; for they mean dollars and cents to you. It makes no difference whether they are sand blistered, punctured, rim cut or blown out, McDaniel will put them back on the job.

Simply send your old tires prepaid to the address below, with your name and address attached. When the tires are received at the McDaniel plant they are carefully examined by experts and all necessary repairs are made. The better cover is telescoped over the other one, then the bead is cut from the outer tire and both are firmly locked together by the SPECIAL McDANIEL DOUBLE TREAD PROCESS. Your old tires are now made into one good tire ready to give you thousands of miles extra service.

DO IT NOW—Send us your worn out tires by prepaid express today and save this extra money.

SIZE	If You furnish 2 Casings	If You furnish 1 Casing	If I furnish Both Casings	Special Gray Tubes
30x3	$3.25	$5.00	$6.75	$1.90
30x3½	4.00	6.00	7.25	2.40
32x3½	4.25	7.25	9.00	2.55
31x4	4.50	7.75	9.50	3.10
32x4	4.75	8.00	10.00	3.20
33x4	5.25	8.25	10.25	3.30
34x4	5.50	8.50	10.50	3.40
36x4	5.75	8.75	11.00	3.50
34x4½	5.75	9.00	41.50	4.10
35x4½	5.75	9.25	12.00	4.25
36x4½	6.00	9.50	12.50	4.35
35x5	6.25	10.50	13.50	5.00
37x5	6.50	11.50	15.00	5.40



Leo McDaniel Rubber Co.,
804 Commercial Ave., CAIRO, ILL.

Auto-Tires

OUR GUARANTEE

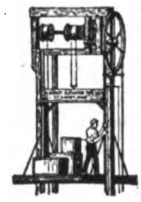
If a tire fails to run 4,000 miles we will replace it with another tire for one-half the below price:

Size	Plain	Non-Skid	Tubes
30x3	$ 8.25	$ 9.00	$2.20
30x3½	10.25	11.25	2.40
32x3½	11.00	12.25	2.65
34x3½	12.25	13.45	2.80
31x4	14.75	16.25	3.10
32x4	15.00	16.60	3.25
33x4	15.75	17.35	3.40
34x4	16.50	17.85	3.75
34x4½	21.75	22.50	4.05
35x4½	22.50	23.30	4.15
36x4½	23.00	23.90	4.25
37x5	27.00	28.75	5.00

Express Prepaid on all orders If accompanied by check in full; otherwise 25 per cent deposit, balance C. O. D. Special proposition to dealers.

Broadway Tire & Rubber Co., Inc.
1777 Broadway, New York

ELEVATORS



Automobile,
Hand and Power,
for
Garages, Warehouses, Etc.

SIDNEY ELEVATOR MFG. CO.
Cor. Miami and Shelby Sts.,
SIDNEY, OHIO

Panvar

is a transparent, enameling lacque that gives to any color car a lasting lustrous finish such as it had when it left the factory. For $1.50 we will send one quart, all charges paid to any point in the U. S. direct—if your dealer does not carry it.

THE PANVAR COMPANY
608 Bulletin Building, Philadelphia, Pa.
H. A. MEYERCORD, Sales Manager.

Will dissolve in the water and stop that leak in the Radiator or Water Jacket

SE-MENT-OL

Ask your Dealer or write direct.
MANUFACTURED ONLY BY
THE NORTHWESTERN CHEMICAL CO., Marietta, O.

Large quantity of Regular Factory Seconds in standard make. Write for prices.

FRANK W. McALLISTER
1761 Broadway, N.Y. City. • Monument Square, Troy, N.Y.

Forty Thousand Dealers *are selling* BENFORD'S

GOLDEN GIANT SPARK PLUGS
Get Your Stock Ready!

A National Cash Register and the N. C. R. Credit File will give you complete control of your business.

THE MANLEY PORTABLE CRANE

Is easier handled and stronger, and less liable to upset than other cranes.
Built in one, one and one-half and two ton capacity.
Write us today for catalog.
THE UNITED ENGINE & MFG. COMPANY
HANOVER, PA.

B. F. S. Valve Grinder

It is a compact, portable motor-driven device capable of grinding perfectly the valves of internal combustion engines, in a fraction of the time usually required by hand methods.

Get the particulars—WRITE.

B. F. S. MANUFACTURING COMPANY
54 Hermon Street Worcester, Mass.

Any Gear, Wheel, Pulley, Off Quick as a Wink, When You Use the "LITTLE GIANT" GEAR and WHEEL PULLER



Terrific pulling power. No "struggle"—no slipping. "Harder the pull, the tighter the grip." Sure, speedy action. Adjustable to 13 in. Tough Drop Forge Steel construction. Price $10. Big Dealer Discount. Send NOW. Money back if not satisfied.
Premier Electric Co., 4033 Ravenswood Ave., Chicago

What is it worth to you to have a correct list of over 300,000 Business Firms in New England?
You may have just such a list for only $7.50
Write the Sampson & Murdock Co.
246 Summer St., Boston, Mass.
and ask for the New England Business Directory

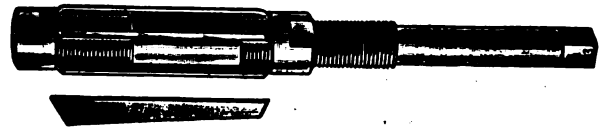
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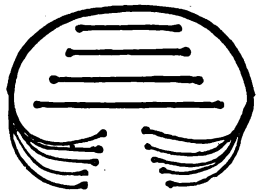


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For Ford Cars

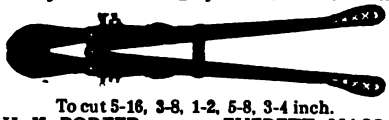
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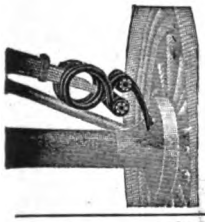
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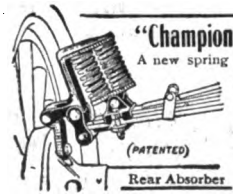
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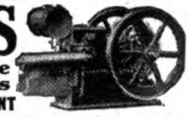


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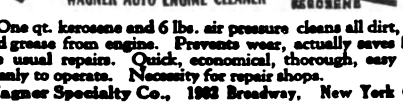
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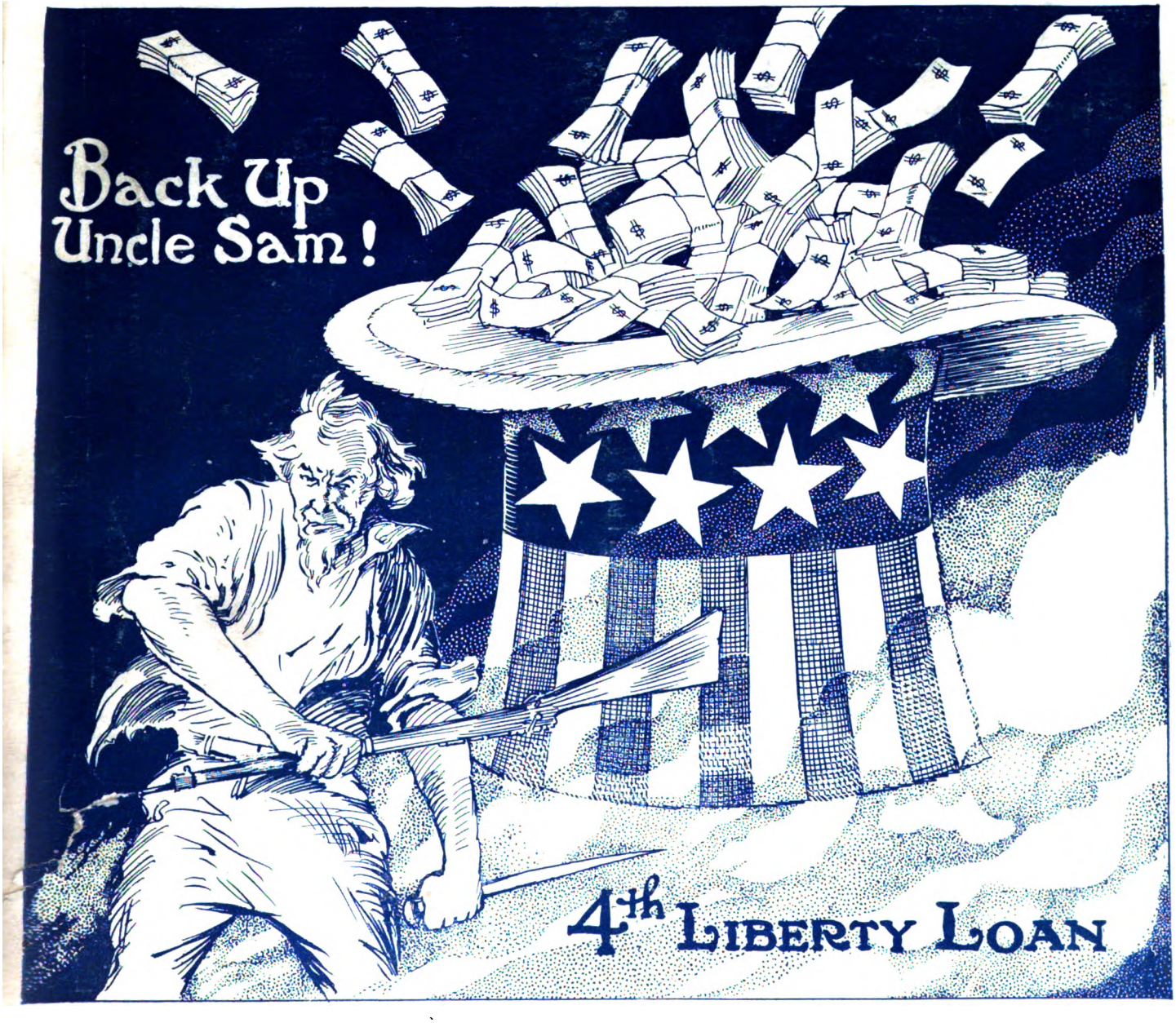
Automobile Dealer and Repairer

A JOURNAL OF PRACTICAL MOTORING

THE MOTOR VEHICLE PUBLISHING CO. 71-73 Murray Street—New York

Entered as Second-Class Matter August 3, 1907, at the Post Office at New York, N. Y., under the Act of March 3, 1879.

Vol. 26, No. 1 NEW YORK, SEPTEMBER, 1918 Monthly, $1.00 per year Single Copy 10 Cents



Buyer's Guide and Index to Advertisements, Pages 77, 78 and 79 Table of Contents will be found on Page 100

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The red box identifies the genuine

CORK INSERT

Transmission Lining for Fords

The success of Cork Insert has resulted in a swarm of inferior imitations. Some imitate the name, some the idea, some the box. Be sure to *get the genuine.*

DON'T TAKE CHANCES when you KNOW the genuine Cork Insert Transmission Lining can be *depended upon* to give *smooth, even friction* to the last mile of service—end grabbing and slipping—give *sure* braking efficiency—and to last so long that it's cheapest in the long run.

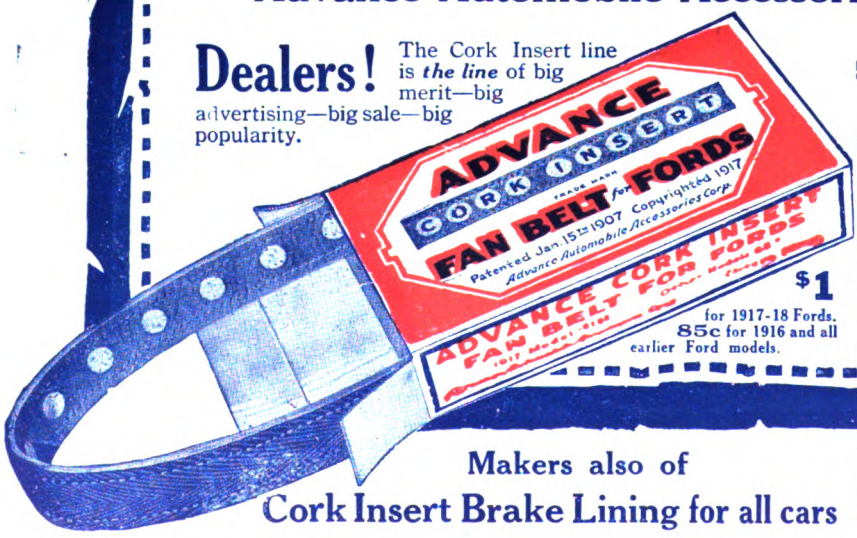
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These Profits for You

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Even after the war it will be many years before European countries have become readjusted so they can supply their own needs in the food line.

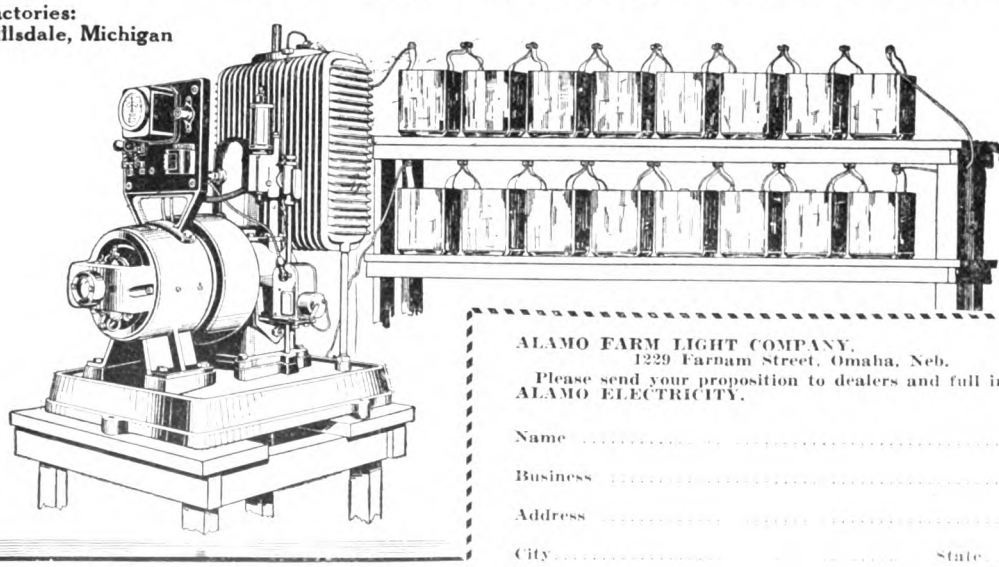
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Factories:
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1229 Farnam Street, Omaha, Neb.

Please send your proposition to dealers and full information about ALAMO ELECTRICITY.

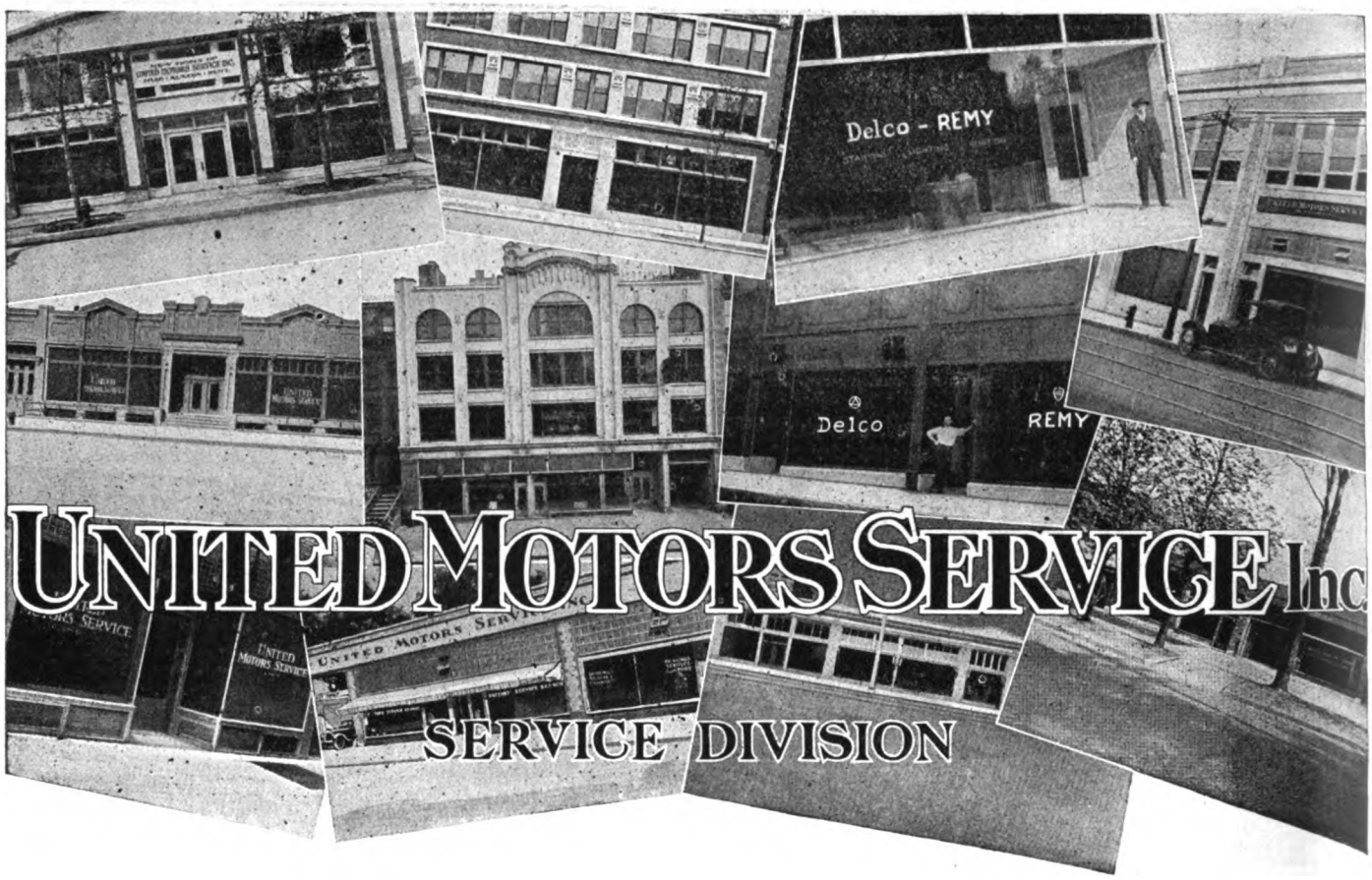
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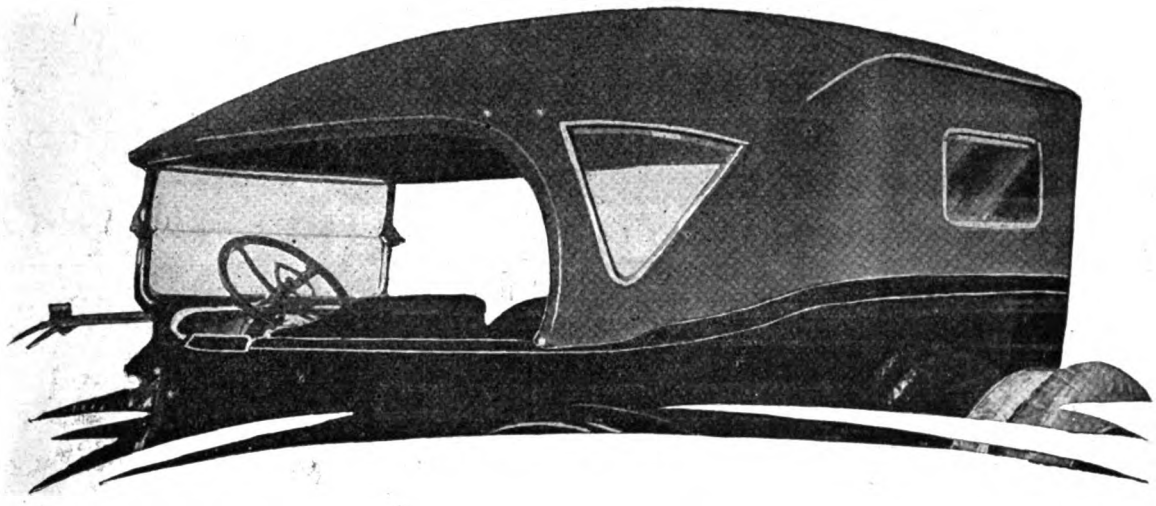
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8 Regular Size Rings 1 Regrooving Tool
4 Over-width Rings 1 Ring Insertion Tool

Give more power
Save gasoline
Save oil
Stop plugs fouling
Stop engine smoking

You will see the difference almost immediately.

Within thirty minutes after you start your engine Munger "Always Tight" Piston Rings will seat themselves perfectly. (The little oil grooves do it.) And once seated, waste and other troubles resulting from compression losses are forever ended.

These rings remain *permanently gastight* because the patent process of peening them makes them conform to the shape of any cylinder (even though worn out-of-true), and the "Always Tight" Expansion Joint compensates for all wear as it occurs without leaving any opening through which gas can escape.

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The new way

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A merchant, with all his troubles, should never do the work that a machine does better and quicker.

Our newest model National Cash Register makes the records which a merchant needs to control his business. It does fifteen necessary things in three seconds.

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With the register, even a new clerk can do them just by pressing the keys.

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The latest model National Cash Register is a great help to merchants and clerks.

It pays for itself out of what it saves.

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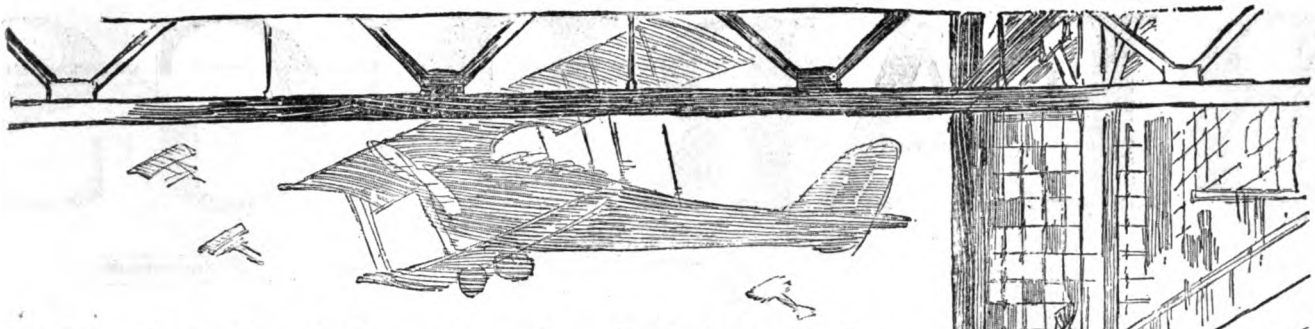
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THE true American wants to work where he will help win the war. He wants to fit in. America needs the Right Men in the Right Jobs. Only when this comes about can maximum production be obtained to support our armies at the front.

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"Industry plays as essential and honorable a role in this great struggle as do our military armaments. We all recognize the truth of this, but we must also see its necessary implications—namely, that industry, doing a vital task for the Nation, must receive the support and assistance of the Nation."

* * *

"Therefore, I solemnly urge all employers engaged in war work to refrain after August 1st, 1918, from recruiting unskilled labor in any manner except through this central agency [the U. S. Employment Service]. I urge labor to respond as loyally as heretofore to any calls issued by this agency for voluntary enlistment in essential industry. And I ask them both alike to remember that no sacrifice will have been in vain, if we are able to prove beyond all question that the highest and best form of efficiency is the spontaneous co-operation of a free people."

WOODROW WILSON.

The U. S. Employment Service is the official bureau of the Federal Government in charge of the distribution of labor. The President has declared that it is the official agency for recruiting and distributing unskilled labor for war work.

It has over 500 branches throughout the nation, and 20,000 U. S. Public Service Reserve enrollment agents. Ask the local post office or newspaper for name and address of the nearest representative, or write to the U. S. Employment Service, Washington, D. C.

Those employers in war work who seek to get labor through their own or private recruiting agencies are interfering with the Government's machinery and preferring their interests to those of the nation. Only through strict compliance with the Government's program can the constant, restless shifting of labor from one war job to another, with the consequent diminution in production and efficiency, be prevented.

Above all, the Government urges every man engaged in war work to stick to his job until the Government recommends that he change. Any man not engaged in war work should put himself at the disposal of the nation by registering with the Public Service Reserve. This is a tremendously important duty! The war worker ranks with the fighter in the trenches. He will help beat the Hun.

United States Employment Service
U.S. Dept of Labor W.B. Wilson Secy



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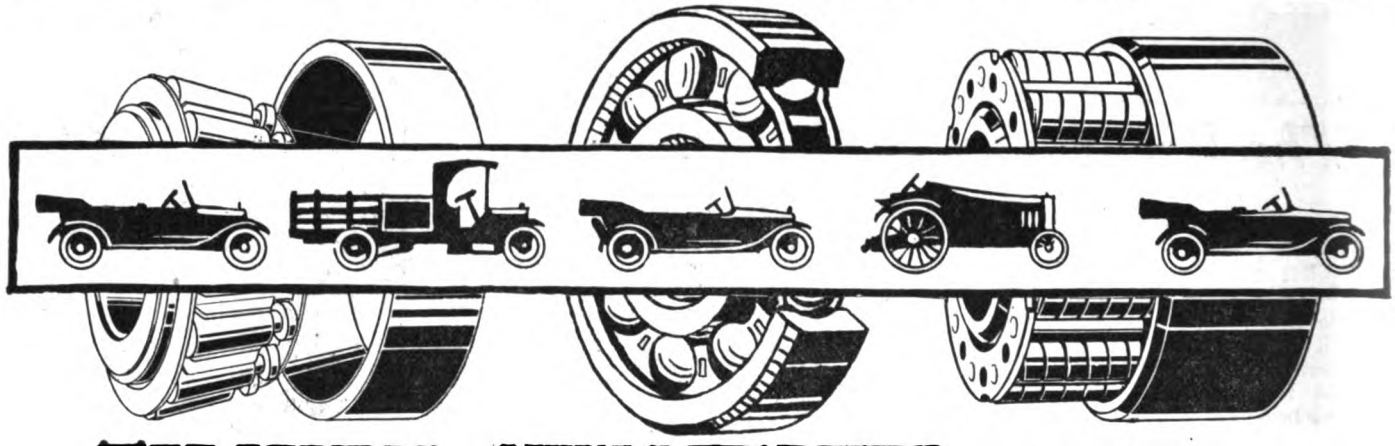
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MOTOR VEHICLE PUBLISHING CO., Publishers of the AUTOMOBILE DEALER AND REPAIRER

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BEARINGS



TIMKEN NEW DEPARTURE HYATT

for any make of motor truck, motor car or tractor ever manufactured

TWENTY-TWO BRANCHES

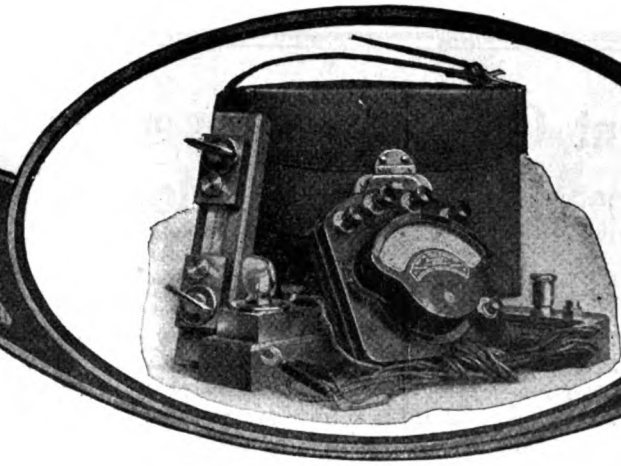
New York	Boston	Seattle	Cleveland	Philadelphia	Pittsburgh
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Authorized Distributors in 500 Other Cities

BEARINGS SERVICE COMPANY

BEARINGS SERVICE COMPANY

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Bespeaking Patience

It has become necessary to advise prospective purchasers of the Weston Model 280 Garage Testing Instrument that deliveries can no longer be made promptly. Under present war conditions, there are unusual requirements which must receive our consideration in advance of commercial orders.

For this reason, we can accept your order only on the basis of delivery when possible. We suggest that you place it as early as you can.

Appreciating fully the needs of our customers and that the radical superiority of the Weston Model 280 Garage Testing Instrument is now well known to the Garage and Service Station men, we promise to execute orders in the order of their receipt and as quickly as conditions will permit.

We are confident that this frank explanation of the situation will be accepted by prospective purchasers in the co-operative spirit in which it is submitted.

WESTON ELECTRICAL INSTRUMENT CO.

2 Weston Avenue Newark, N. J.

23 Branch Offices in the Larger Cities

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U. S. Government Orders big cut in production of new tires and tubes. That means Dealers must do More Tire Repairing

WAR TRADE BOARD BULLETIN of August 1st to tire manufacturers states:

"You are hereby notified that during each of the months of August and September, 1918, that in the manufacture of pneumatic tires and tubes you shall restrict the production in tonnage of rubber consumed and in numbers of casings and tubes to the extent of 50% of the production for the corresponding months of August and September of last year.

"In no event shall your manufacture of pneumatic casings or tubes, during the month of August, 1918, and the month of September, 1918, exceed 50% of the monthly average of 1917 both as to the amount of rubber used and number of pieces produced. This restriction is exclusive of Government business."

THIS MEANS that every car owner *must* have his old tires and tubes repaired over and over again to yield the last bit of mileage before discarding them. And it opens up the Biggest Opportunity in history for larger and more profitable business in tire repairing. Grasp this opportunity by installing

Akron-Williams

TIRE REPAIR EQUIPMENT

Used, Recommended and Sold by All Leading Tire Companies

Most Complete Line

There is an Akron-Williams outfit for every size shop and a machine or tool for every purpose in tire and tube repairing. No equipment is too large—no tools too small.

Every piece of our equipment has been designed and perfected with the co-operation of engineers employed by the leading tire companies; and the outfits we offer you are the same as used in over 100 tire factories and sold to Dealers all over the world.

Prompt Shipments

We have recently completed a large three-story addition to our plant, devoted wholly to the manufacture of equipment for repairing and re-building pneumatic tires and inner tubes.

With these increased facilities, we can now make practically *immediate shipments* on all orders.

War time is Tire Repair Time.

Don't let someone else get your share of these New Profits. Prepare now.

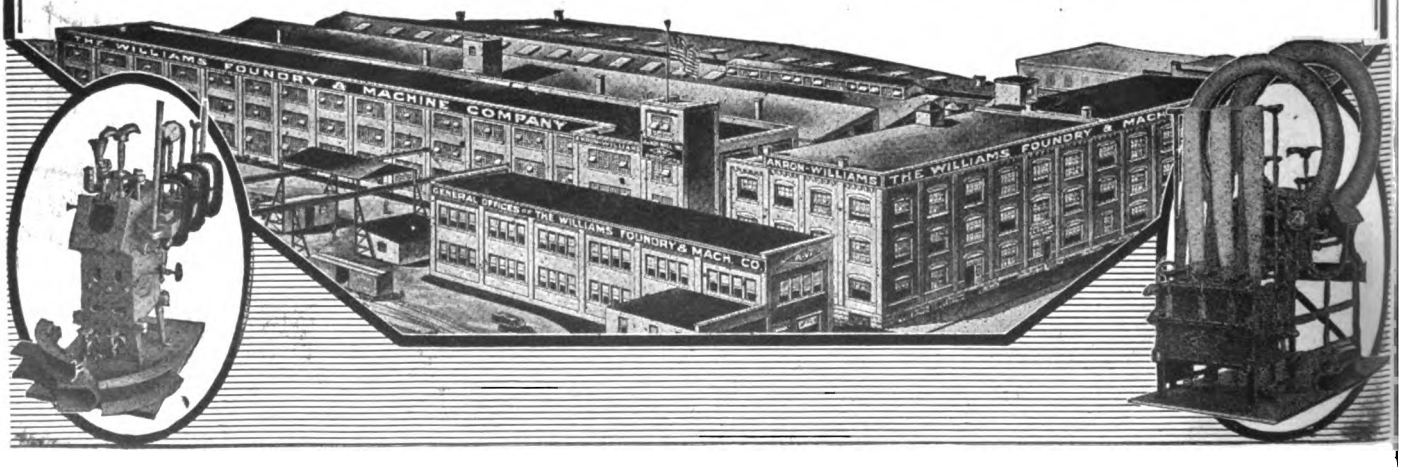
Send for New Catalog, Brimful of Time- and Labor-Saving Devices

AKRON-WILLIAMS A-W PRODUCTS

THE WILLIAMS FOUNDRY & MACHINE COMPANY

GLENDALE STREET AKRON, OHIO

Exclusive Distributors for California: The Waterhouse & Lester Co., San Francisco, Oakland and Los Angeles



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Johns-Manville



It's the Asbestos that Determines a Brake's Reliability

MANY times a day safety depends wholly on the grip of the car's brake linings. Probably they're of ASBESTOS—but don't rest content with that assurance, for ASBESTOS varies.

It's the quality of the fibre that counts—and many tons of ASBESTOS must be sorted over for a ton of suitable brake lining fibre. The way to make safety sure is to insist on NON-BURN, made at ASBESTOS Headquarters—a Johns-Manville Product from mine to market.

We take thousands of tons annually from our own mines, and, as the world's largest producers and manufacturers of ASBESTOS, we can pick and choose. NON-BURN wears, and is safe and sure, simply because we put into it only strong high-grade fibres specially selected for brake service.

H. W. JOHNS-MANVILLE CO.
New York City
10 Factories—Branches in 61 Large Cities

NON-BURN
ASBESTOS
BRAKE LINING

When you think of Asbestos you think of Johns-Manville

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Have You Any War Orders?

If You Have Not, You Must Get Some

Automobile manufacturers are loading up with them, and motor car production is automatically slowing down in proportion.

Self-preservation should show you the necessity for diversifying your business as much as possible.

You can do this and help the country at the same time.

Put it the other way: Help your country and prosper.

Take the great question of food production; where do you fit in?

Farm tractors mean more and better crops. The war has jumped the tractor proposition twenty years ahead of a normal, peace-time basis.

Get busy on the tractor end. Study the subject. Get in right.

Other things that help the farmer may legitimately be a part of your stock.

His cars, his trucks, his motor equipment—including farm lighting outfits—all these things and many more work in with an Automobile Accessory Dealer's selling system.

The farmer—the country—the dealer—all are vitally interested in bigger production and bigger business all around.

So go after your sort of war orders; the call is imperative.

Published in the interest of the Dealer by the National Association of Automobile Accessory Jobbers

Our booklet—"How to Run a Garage"—is free for the asking—it's practical, helpful reading, that gets right down to cases

THE NATIONAL ASSN. OF AUTOMOBILE ACCESSORY JOBBERS MEMBER

National Association of Automobile Accessory Jobbers

WM. M. WEBSTER, Commissioner

1920 City Hall Square Bldg. CHICAGO, ILL.

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Why—



IT'S MONEY in your pocket when you can establish a reputation for rapid service among car owners in your neighborhood.

That is one reason why you should push Harvey Springs

Besides rapid service, the product you sell must be of good quality, honestly made.

That is another reason why you should push Harvey Springs

A product that has made a name for itself and has gained the good will of car owners is much easier to sell.

That is still another reason why you should push Harvey Springs

You will generally find that a product in which you, yourself place absolute confidence a product you feel sure of, is easy to dispose of at a profit.

And that too is a reason why you should push Harvey Springs

Satisfaction to car owners — satisfaction to dealers — that is the ideal combination.

And that is the final reason why you should push Harvey Springs

THERE'S A HARVEY JOBBER NEAR YOU — Write us and we will send you his name and address, and our latest catalog, giving complete specifications of over 900 different styles of Springs.

Write today — you may need Harvey Help tomorrow.

Harvey Spring & Forging Co.

921 17th Street **Racine, Wisconsin**

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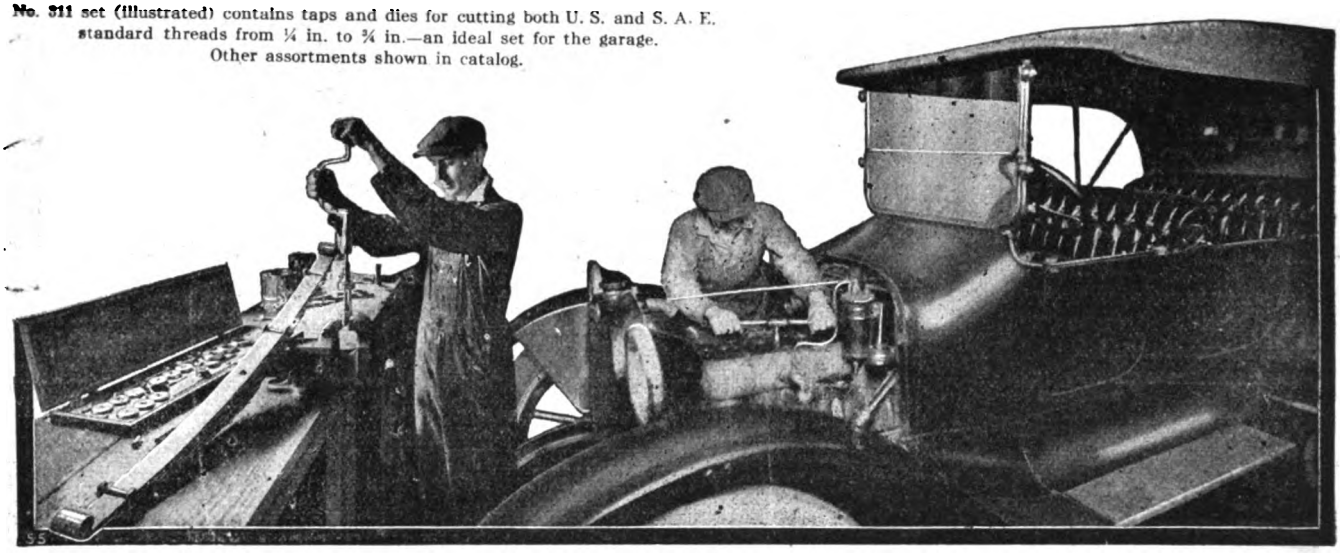


Easy Cutting Taps and Dies

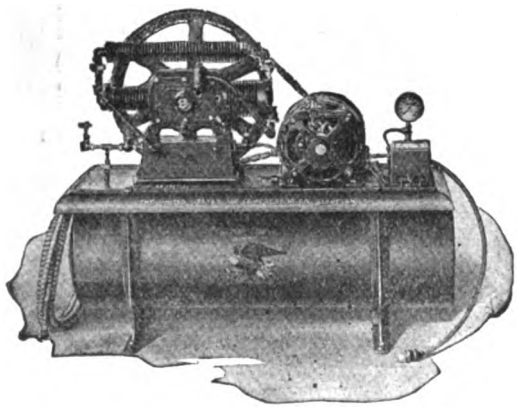
Little Giant taps and dies are sharp, clean cutting tools. The dies are adjustable and can be reversed to cut close to a shoulder.

Greenfield Tap and Die Corporation
Greenfield, Massachusetts
New York, 28 Warren St. Chicago, 13 S. Clinton St.
Detroit Office, 74 Congress St., W.
Canadian Factory, Wells Bros. Co. of Canada, Ltd., Galt, Ontario

No. 311 set (illustrated) contains taps and dies for cutting both U. S. and S. A. E. standard threads from ¼ in. to ¾ in.—an ideal set for the garage. Other assortments shown in catalog.



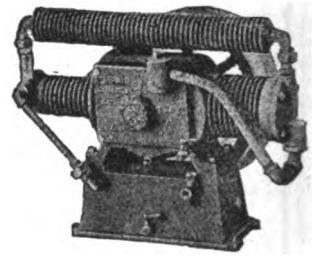
The United States line comprises 20 different numbers in Two-Stage and Single-Stage Types, and various individual equipment adapted for forming combinations of almost unlimited kinds and capacities.



The World's Best Air Compressor—The U. S. De Luxe Two-Stage Automatic Air Unit. Contains 14 noteworthy refinements and improvements. The Ideal unit for free air stations, garages and tire shops. Capacity, 4 cubic feet per minute. Completely self-contained.



Consider the Judgment of Millions of Autoists



A SINGLE-CYLINDER (single-stage) hand pump is now rarely, if ever seen. Automobile owners have learned the superiority of the compound (two-stage) pump, and the single-stage device has just naturally passed out of existence.

If garage and tire repair men would consider these facts in purchasing a power air compressor, few would buy anything but a **two-stage** compressor.

If the two-stage principle is superior in the hand pump, it is obviously superior in the power pump. This is specially true of United States Two-Stage Air Compressor because, while utilizing the same proven principle as the hand pump, they contain no stuffing boxes (the one objectionable feature of hand pumps) and furthermore, because they are improved in 14 other important details. The catalog describes all these features in complete detail. Everyone should have a copy. Send coupon for yours today.

The United States Air Compressor Co.

6536 Carnegie Avenue, Cleveland, Ohio

Please send your new Catalog advertised in Automobile Dealer and Repairer to

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Stop This Waste!



Over 200,000 Gallons of Gasoline Escape from Tank Vents Daily.

More than one-fifth of all the Government's daily war needs of gasoline is wasted by evaporation or splashage through the vent holes of tanks on automobiles, trucks, tractors, motor boats and stationary engines. Conclusive tests at Armour Institute and the Associated Engineering Laboratories have established the existence of this waste, and proved that it can be stopped by equipping a car with an

Imperial Gas-Tank Seal

Dealers and garage owners everywhere will build up good will and make increased profits by showing motorists how to save from $12 to $40 a year and get more mileage by equipping their car with the Imperial Gas-Tank Seal.

Easily installed — simply bore a ⅜-inch hole in the filler cap—cannot get out of order and works equally well with either Gravity or Vacuum Systems. The valve admits air automatically, to replace gasoline used through the carburetor.

When ordering Imperial Gas-Tank Seal, state whether it is for Gravity or Vacuum Feed Systems. We shall be pleased to mail you our Free Pamphlet, "Where the Gasoline Goes," on request.

THE IMPERIAL BRASS MFG. CO.
520 S. Racine Ave. CHICAGO

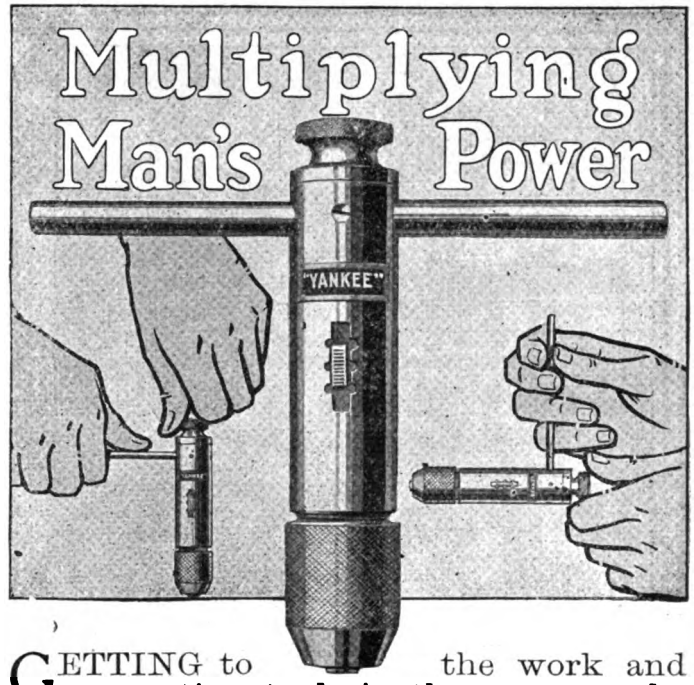
Cold weather is approaching—now is the time to stock up on the Imperial Primer. Motorists everywhere will want one. Cars thus equipped will start instantly in cold weather regardless of grade of fuel used. Complete and easy to install. Price $5.50 to $6.00 complete. Full details on request.

Jobbers and Dealers: Write for full information.



$3.50 Prepaid.
$4.50 in Canada.

Multiplying Man's Power



GETTING to the work and operating tools in the many nooks and corners of a car are the auto mechanic's big problems. His time and energy must be saved—now more than ever.

The "YANKEE" Ratchet Tap-wrench, with the famous "Yankee" Ratchet Movements, makes it easy to tap holes in close quarters where interfering parts render it impossible to use an ordinary tap-wrench without taking down the construction.

Three positions of the Ratchet Shifter give Left-hand, Right-hand or Rigid adjustment as desired—enabling you instantly to adapt the tool to any situation. A working efficiency on difficult jobs that can't be equalled with other tap-wrenches!

"YANKEE" Ratchet Tap-wrench

The cross-bar is held central, or at either end, by a friction device. Or you can remove it entirely—as for close packing in tool chest. Has knurled thumb-piece at top, to start or back out taps quickly; and counter-sunk hole for centering and revolving tool on lathe.

No. 250 — Length, 3¼ in.; Diameter of Chuck, ¾in. Holds up to 3/16 in. taps..... **Price, $1.70**

No. 251 — Length, 5 in.; Diameter of Chuck, ⅞ in. Holds up to 5/16 in. taps..... **Price, $2.40**

No. 1251 — Length, 13 in.—for work requiring long reach—otherwise same as No. 251 **Price, $3.00**

Your dealer can supply you

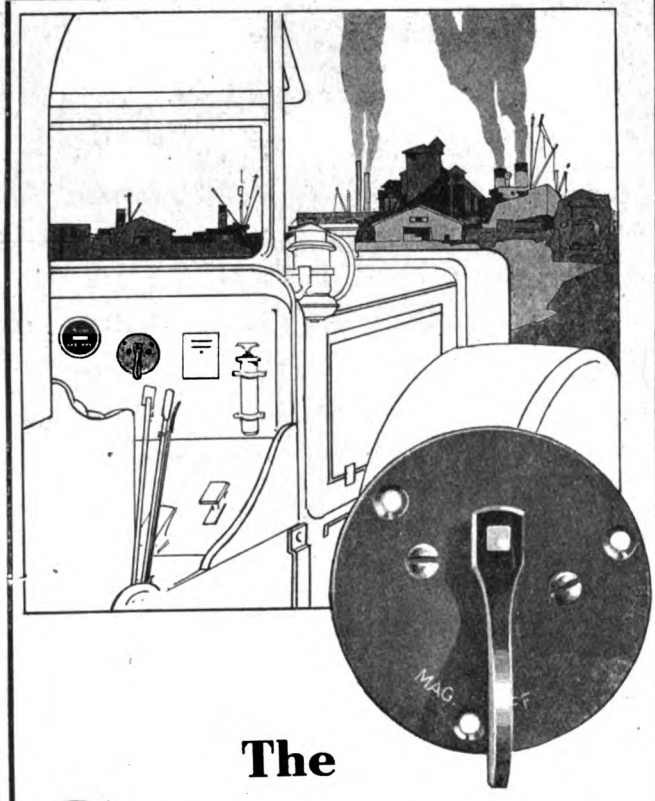
Get the "'YANKEE' Tool Book"—FREE. Illustrates and describes many ingenious "YANKEE" Tools for saving time and labor, in drilling and working in metal, boring in wood, drawing screws. Write to

NORTH BROS. MFG. CO., PHILADELPHIA

"YANKEE" TOOLS

Make Better Mechanics

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The

CONNECTICUT

Flush Dash Kick Switch is Built for Rough Usage

The average truck driver is more apt to use his feet than his hands for manipulating the ignition control, and it takes a pretty husky type of switch to stand up under such handling.

That is why the Connecticut Flush Dash Kick Switch has found such general favor for truck installations. Not only is it one of the most compact ignition controls ever devised, but nothing about it projects beyond the face plate of the dash, except the lever. This lever, besides being sturdy enough to withstand the most strenuous handling, is removable, thus acting as a lock for the ignition system.

Type "B", with positions "Off", "Bat"—for battery systems, $1.25.

Type "M", with positions "Off", "Mag"—for high tension magneto systems, $1.25.

Type "MB", a four-position switch for two independent systems of ignition, with positions "Off", "Bat", "Bat" & "Mag", "Mag".

The type "MB" switch meets with the War Department's specifications for truck ignition equipment in every detail.

CONNECTICUT TELEPHONE & ELECTRIC COMPANY
MERIDEN CONN.

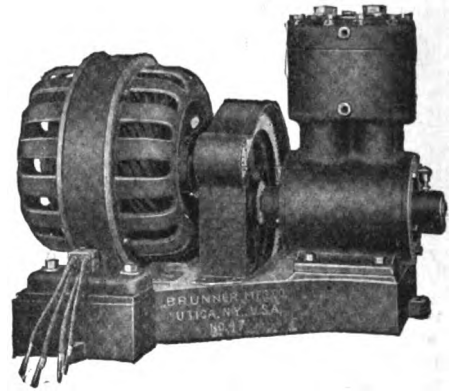
"The Motorist who is Brunnerwise knows Brunner Service Satisfies"

The Coufidence of the Motoring Public Is the Garageman's Greatest Asset.

BRUNNER

Automatic Garage Air Compressors inspire confidence because they are absolutely reliable and the motorist knows that he is going to get service every time he pulls up in front of the garage displaying the Brunner Sign.

The bright red center of the Brunner Signs along the highways are eagerly sought out by thousands of Brunnerwise motorists.



The Brunner Air Compressor is a quality product which has always been sold strictly on its merit without advertising promises of impossible performances.

The Brunner is the pioner Garage Air Compressor and there are more Brunner Air Compressors in use in garages than there are Air Compressors of any other make.

BRUNNER AIR SERVICE
AIR
THE MOTORIST WHO IS BRUNNERWISE KNOWS BRUNNER SERVICE SATISFIES

Increase the efficiency of your service—conserve your labor, Mr. Garageman—Install a Brunner Automatic and display a Brunner Sign on your garage.

Let us send you our No. 15 catalogue and the name of the Brunner Jobber covering your territory—Brunnerize your garage.

BRUNNER MANUFACTURING CO.
Main Offices and Plant—UTICA, N. Y.
Western Branch—CINCINNATI, OHIO.

"The Motorist who is Brunnerwise knows Brunner Service Satisfies"

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The Inland Spiral Cut is an exclusive Inland patent.

Its construction *cannot* be duplicated in any other piston ring — its advantages *are not* equaled by any other piston ring.

The Spiral Cut

makes the Inland gas-tight in every way. It makes it simple; therefore stronger and more durable. It makes it ONE-PIECE—therefore low in price—$5 to $10 less per set than any other make of really gas-tight ring.

INLAND

1 Piece Piston Ring

Over 2,000,000 Already Bought

prove how quickly Inland's superiority has been recognized. Put the Inland sign in your place and watch how quickly the overhauling business comes your way. Jobbers everywhere stock Inlands—ask yours.



INLAND MACHINE WORKS
802 Mound Street, St, Louis, Mo.

"NORMA" PRECISION BALL BEARINGS

(PATENTED)

Quality—a thing sought after by every car and truck builder—a thing intangible, almost indefinable, but the most desirable element in a car or truck. One thing, however, is sure—quality must be consistently uniform throughout every part, every accessory, and every part of every accessory. There can be no minor flaws in the perfect jewel of high quality.

"NORMA" High-Quality Bearings are the standard bearings in those high-quality magnetos and lighting generators which are found so consistently good as to be the standards on high-qualing cars and trucks. "NORMA" Quality explains.

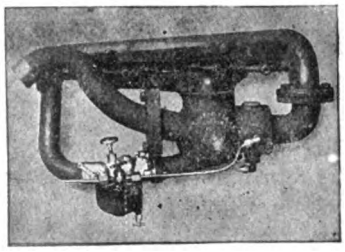
Be Sure—See that Your Electrical Apparatus Is "NORMA" Equipped

THE NORMA COMPANY OF AMERICA

1790 BROADWAY NEW YORK

Ball, Roller, Thrust and Combination Bearings.

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The Olsen Kerosene Vaporizer Is Saving Ford Owners 70% on Fuel

Burns clear kerosene. Makes a thoroughly dry vapor. *Perfect combustion—no smoke, waste, or odor.* Equal power to gasoline. More mileage. Flexibility increased on all speeds Lubrication unaffected. Carbon practically abolished.

Fits any regular carburetor. Simple to install. No engine changes, no extras, no after adjustments.

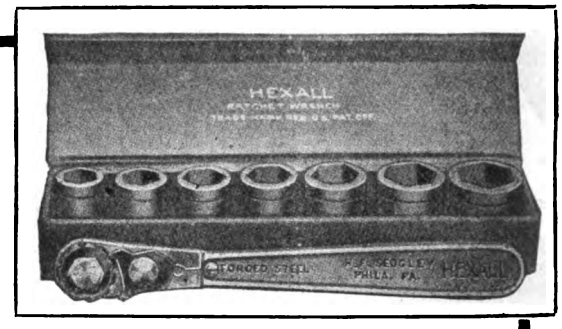
Equip your Ford with an OLSEN and save $7 out of every $10 for fuel. Send for details

Satisfaction Guaranteed or Money Back in 30 Days on Request

DEALERS: The OLSEN offers a Live Proposition. Ask Us.

U. S. VAPORIZER COMPANY
213 State Street Boston, Mass.

"HEXALL" No. 3
RATCHET SOCKET WRENCH



It is certainly easier to sell Sedgley Wrenches than not to sell them —what argument can you use in offering less reliable wrenches other than that of cut prices?—which prejudice desirable customers.

Contains 7 in. Ratchet Handle and 7 Hexagon Sockets for Bolts and Nuts, with same range as No. 2 set. Packed in neat strong cloth case. Weight, 29 ounces.

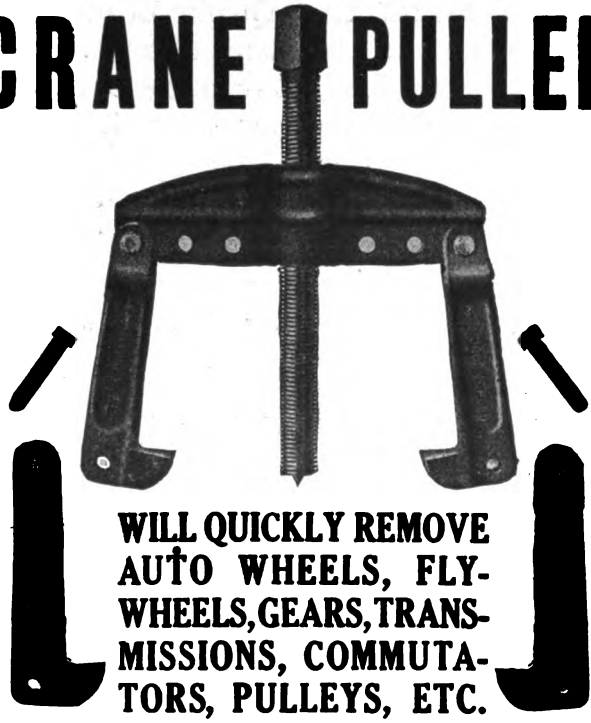
"Break any Sedgley Wrench and we repair it—no charge"

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R. F. SEDGLEY, Manufacturer, 2311-13 North 16th St., PHILADELPHIA, PA., U. S. A.

Pacific Coast Representatives, McDONALD & LINFORTH, San Francisco, Cal.

Pull It Off With a CRANE PULLER



WILL QUICKLY REMOVE AUTO WHEELS, FLY-WHEELS, GEARS, TRANS-MISSIONS, COMMUTA-TORS, PULLEYS, ETC.

Send for Catalog of our Pulling Devices

CRANE PULLER CO., 54 Lake St., Arlington, Mass.

USE PLUGS THAT HELPED RAISE CITIES OVER NIGHT



Spark plugs were a big factor in the rush cantonment work. They helped keep truck fleets on the go. In this work, Reflex Plugs insured reliable ignition for hundreds of Whites and other makes of trucks.



REFLEX SPARK PLUGS



Reflex equipped White Truck rushing materials for building "Cities Over Night."

Keep the Car on the Go

Reflex chromite porcelain and special electrode construction are, here and abroad, meeting the urgent service of today's passenger cars and trucks. A trial will convince you of their ruggedness.

DEALERS: Inquire about your territory. Learn of the exceptional profits made by Reflex Dealers.

THE REFLEX IGNITION CO.
1711 Payne Avenue Cleveland, U. S. A.

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AUTO TOP SPECIALISTS

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RAIN-SNO CLEAR VIEW WINDSHIELD CLOTH



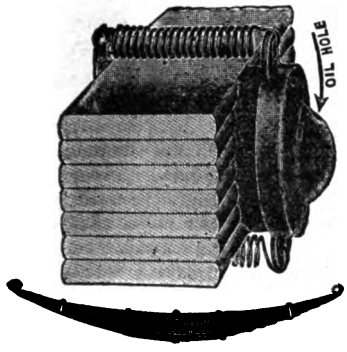
PREVENTS ACCIDENTS—Just rub it over the glass

Rain or Snow cannot collect to obstruct the vision. Insist upon the "RED CLOTH," which is guaranteed to give continuous use for one year or money refunded. For Sale by Accessory and Hardware Dealers or by Mail Postpaid, 50c each.

Made only by

SUFFOLK MFG. CO., Inc. Dept. C. 69 Long Wharf, Boston, Mass.

STERLING SPRING LUBRICATORS



Are Essential to Easy Riding Springs. RUSTY AND UNYIELDING SPRINGS DO NOT TAKE UP SHOCK.

Automatic lubrication of springs means easier riding and less wear and tear on springs, rods, shackles and tires. Less squeak and less rattle

Enjoyment and Life of Every Car Increased.

Price 25 Cents Each
Ford Set Complete for $1 00
Same Size Fits All Cars
Easily Attached Self-Adjusting Inconspicuous

Dealers, write for catalog and discounts.

THE STERLING MANUFACTURING COMPANY

307 Frankfort Ave., (*Lubricator Dept*) CLEVELAND OHIO

TRADE MARK Red Devil Tools

"Red Devil" Flexible Blades



are made from Tungsten steel, giving maximum hardness without brittleness. Teeth are extremely hard and strong; back is flexible (see illustration).

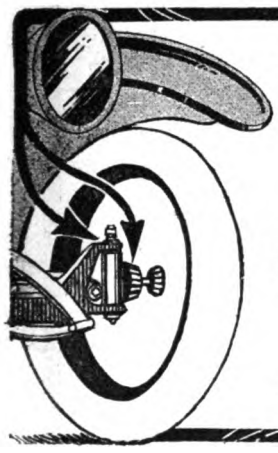
Will cut practically anything without breaking or teeth stripping because tempered *one at a time.*

Teeth are milled from blank, not punched, insuring sharp, square points that cut metal as easily as a rip-saw cuts wood.

"RED DEVIL" Hard Blades and Power Blades are just as painstakingly made as the Flexibles.

Ask your dealer for "RED DEVIL" Blades and other tools.

SMITH & HEMENWAY CO., Inc., 83 Coit St., Irvington, N. J.



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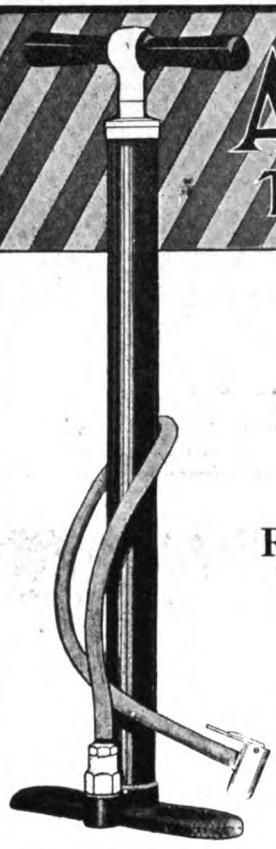
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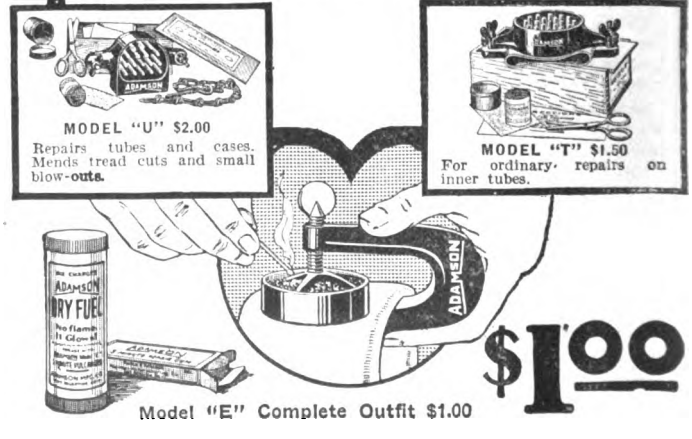
Use gasoline instead of Dry Fuel if desired. Extra can of Dry Fuel 50c; extra box of 12 patches, 25c.

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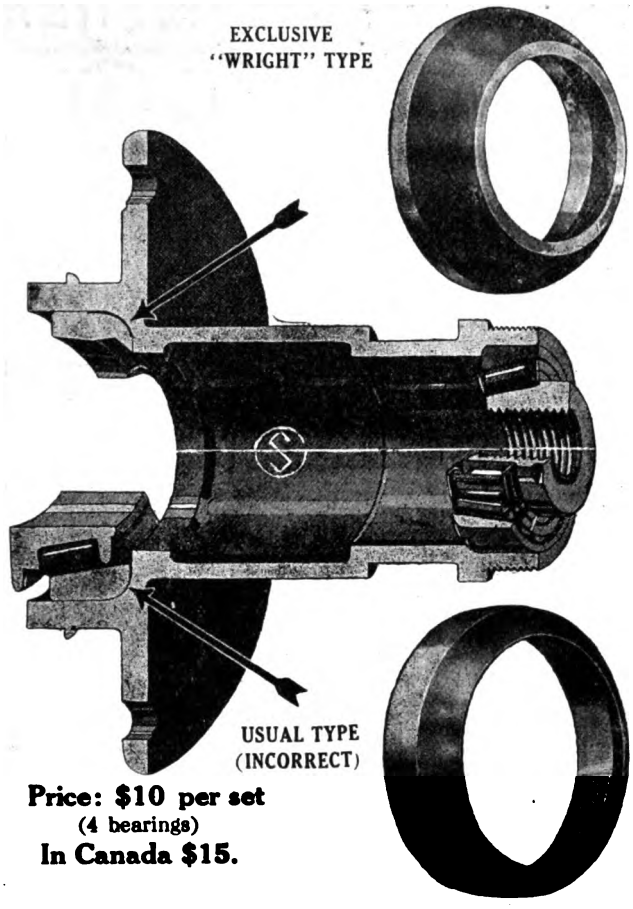
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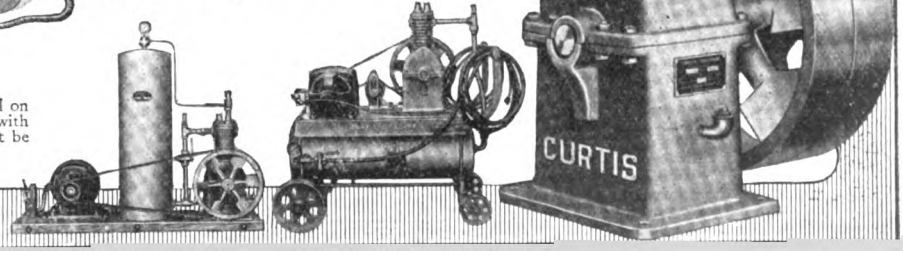


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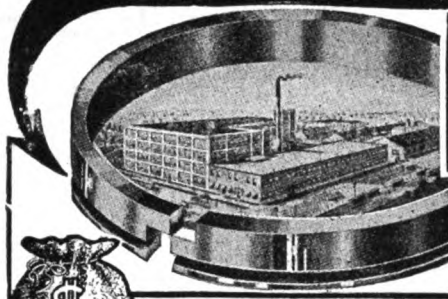
The Curtis Sign

Illustrated above—is 10x14 inches—baked enamel on steel. Cannot be bought, but is furnished FREE with every CURTIS Garage Air Compressor—and cannot be had in any other way.

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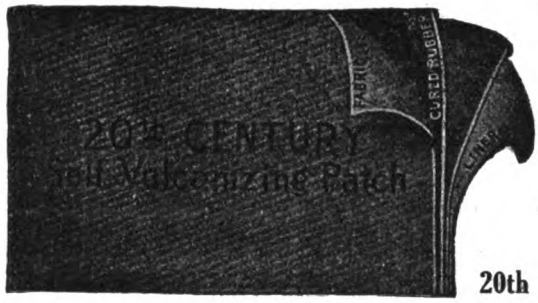
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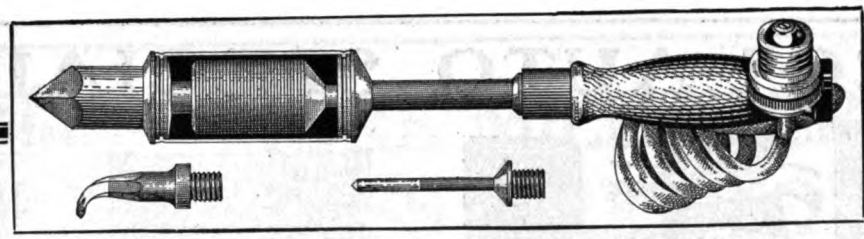
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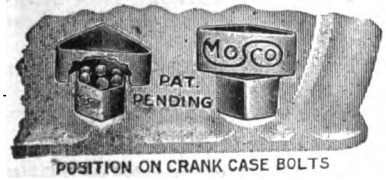
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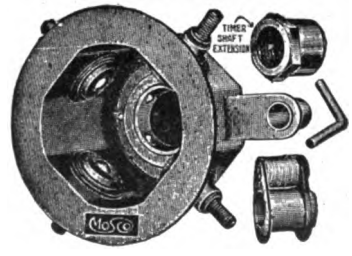
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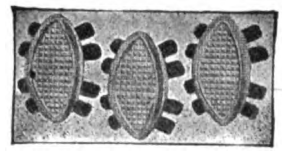


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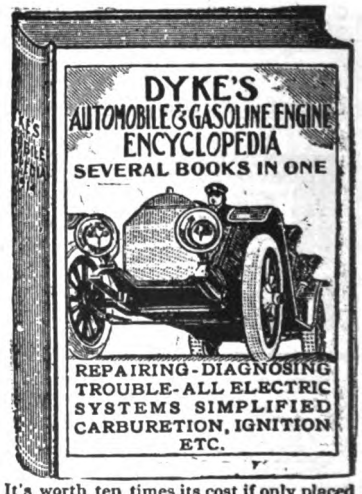
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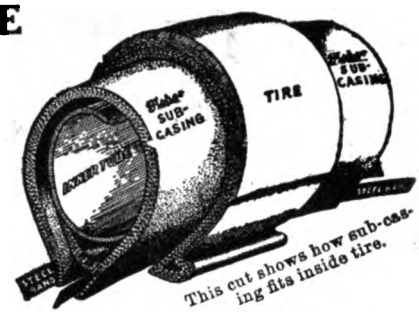
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These weakened places are hard to detect now, but will result in blow-outs later.

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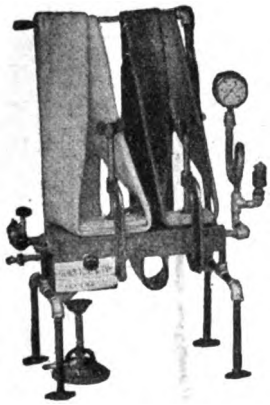
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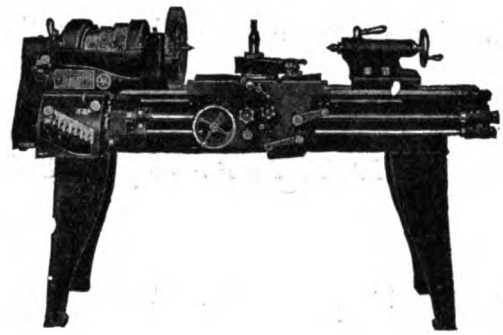
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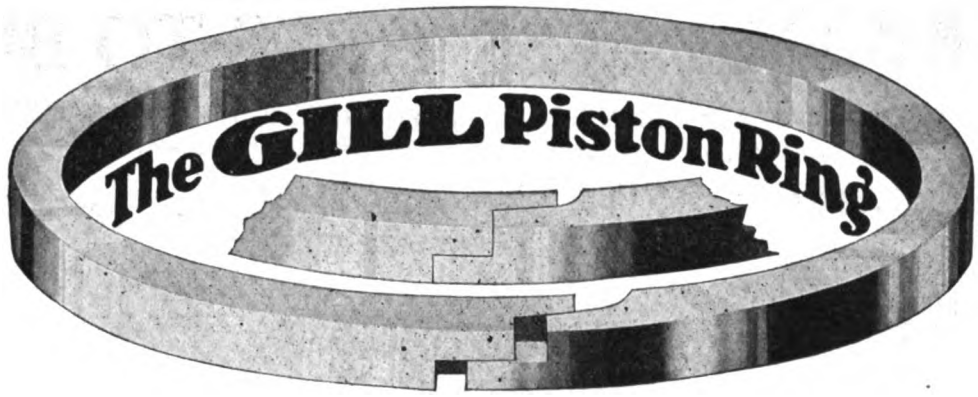
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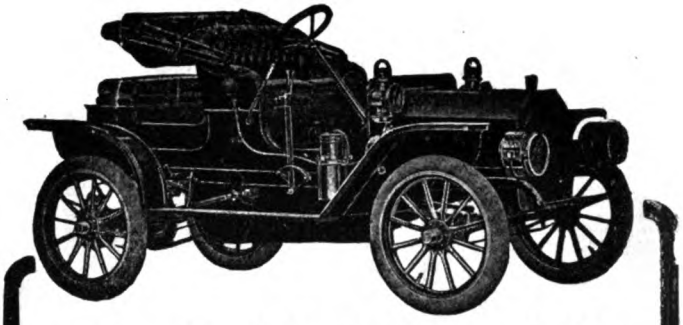


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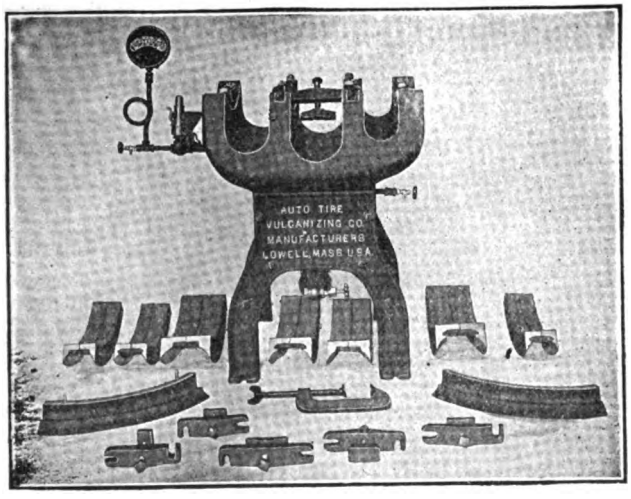
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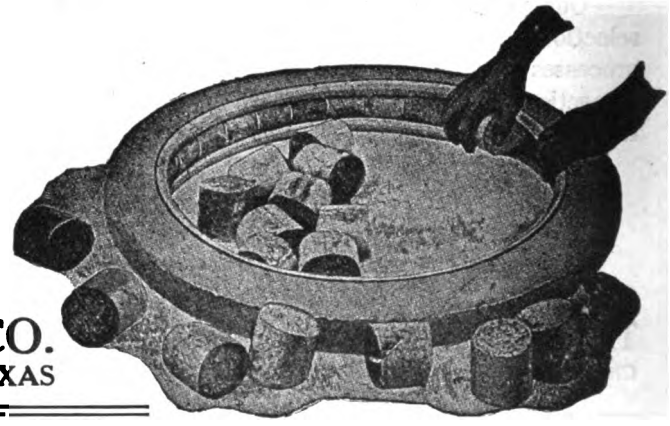
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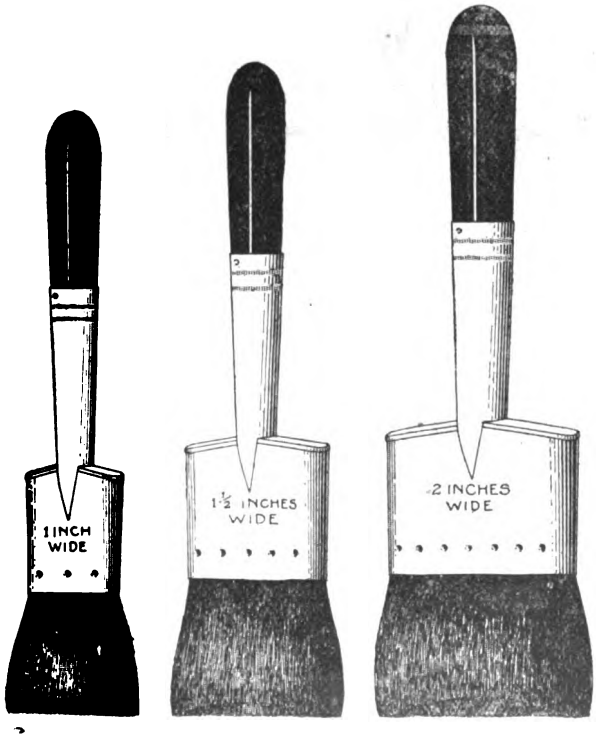


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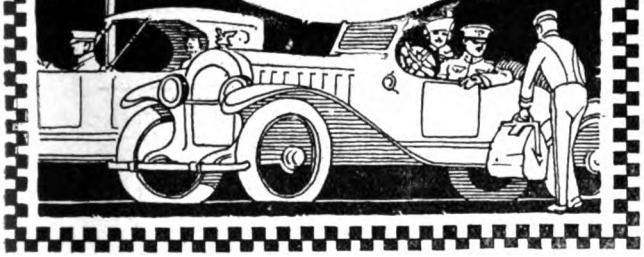
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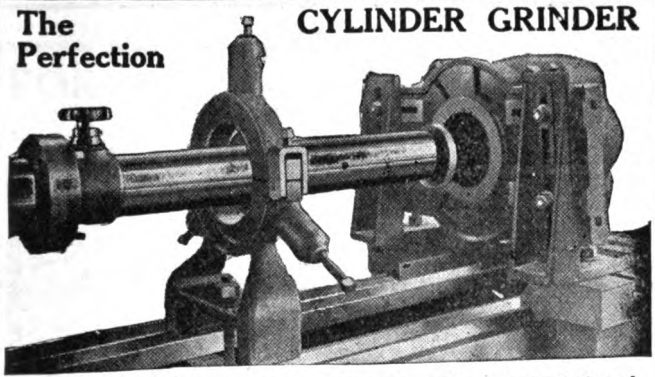
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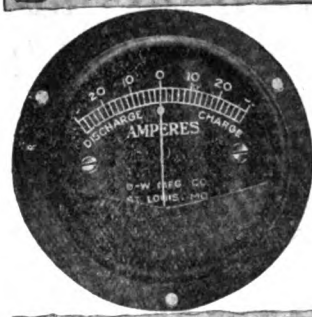
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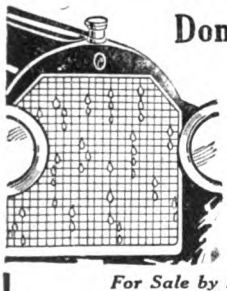
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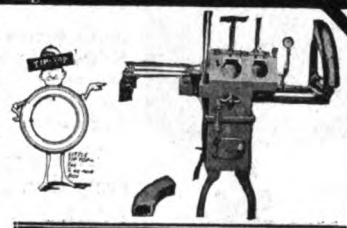
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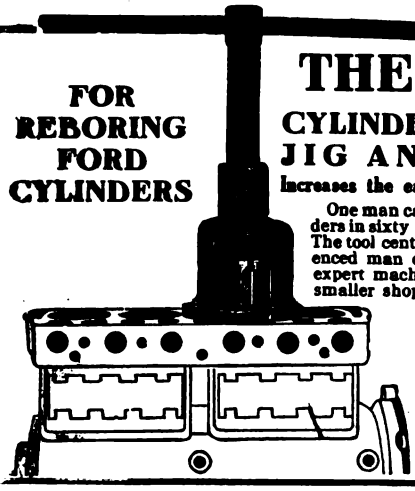
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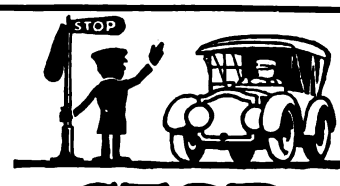
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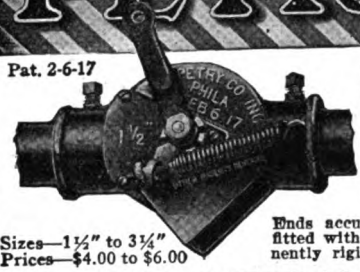
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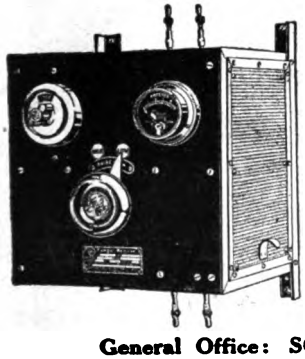
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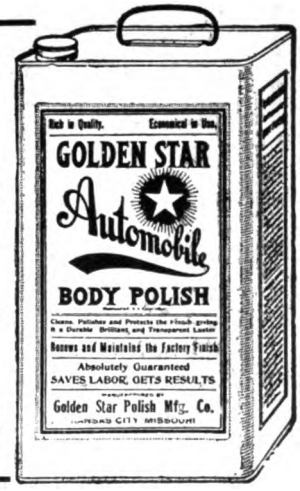
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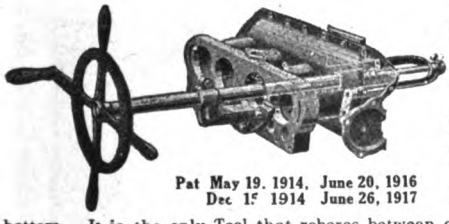
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A Journal of Practical Motoring
Registered in the U. S. Patent Office

VOL. XXVI. No. 1. NEW YORK, SEPTEMBER, 1918. PRICE {10c. PER COPY / $1.00 PER YEAR

Sick Cars and the Diagnosis of Trouble

How One May Find and Cure the Various Engine Troubles Commonly Occurring. The Last of the Sick Car Series

EVERY time I take a walk in the street and see abused automobiles limping along, I am prone to think of them as people. Every time I ride in an automobile, hear its grumbling and its moans, the resemblance is brought home to me strongly.

I have a neighbor who is a God-fearing man and looks as though he might be extremely kind-hearted as well as benevolent. The dogs on the street are his friends and I seldom hear him speak a harsh word to his nearest relative, his wife. At the same time, however, I will admit that I am a bit prejudiced against the gentleman. If there were a society for the prevention of cruelty to automobiles, my neighbor would soon find himself caught in its toils.

He has no mercy for his machine and I really believe if his automobile happened to lose three wheels, he would try to get home upon the fourth. I often wake in the middle of the night, my hair standing upright and a chill running down my spine, cold sweat on my brow, all from horror at the fearful moaning and wailing of his machine which he is enticing into his garage.

An automobile is very much like a person. Its years of life are short, but into these years are often crowded much kindness and usefulness for man.

Automobile sickness and ills may be divided into two great classes, nervous disorders and stomach trouble. Stop and think a minute and see if you can make any other classification than this. If an automobile engine stops it stops either because the ignition system has gone wrong or because it is not getting a sufficient supply of gas.

Now don't misunderstand me. I said automobile sicknesses. I didn't say automobile accidents, for it is not my intention to take up all of the accidents that an automobile might undergo.

An automobile's stomach is its carburetor. The carburetor is obliged to chew the food, if we may use this expression, mix it with the correct amount of air, or digest it, and pass it along to the engine in a digested condition. If the carburetor does not vaporize or chew its food completely, the engine acts sluggish or possibly does not run at all.

This trouble is noticeable particularly in the cold weather. The engine has a "stomach ache" and needs a hot-water bottle.

At the end of this month many motorists will be arming themselves with suitable medicines and paraphernalia to cure or prevent this disease which I call engine stomach trouble.

There is one medicine which can be carried in the tool kit very handily. Its action is immediate upon application. The medicine I speak of is ether. The dose ordinarily is about one spoonful. Divide this liquid into four portions and pour one portion into each priming cock. It is a predigested food and the engine usually starts off with a "bang," immediately.

Now ether for an automobile is like morphine for a person. Don't use it too much. Its effect may be lasting if it is used in quantities. Don't use it unless it is absolutely necessary.

A hot-water bag on its stomach often solves the problem. Let me tell you how to make a handy hot-water bag for it. Take a long stocking and fill it with sand, or make up a tube two inches in diameter and twelve inches long and fill this with sand. On a cold winter's morning put this bag in the oven or near the furnace and let the sand warm through thoroughly. Then when you get ready to start your machine, wrap the bag around its "neck." I mean around the intake manifold just above the carburetor. In about two min-

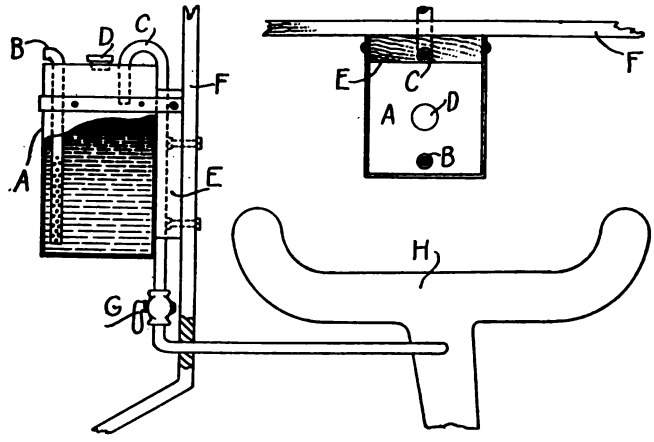
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utes the manifold will be warmed through and the engine can be started very easily.

Luckily, an engine does not mind extremes of heat and cold like a human being. This being the case, you don't need to worry about whether the sand is too hot or not. You can use a horseshoe around the manifold or most any piece of iron will answer the purpose if it is heated through before it is put in place. When an engine's stomach is warmed it digests the food much more easily than when it is cold. Just remember that, or in fact, if you know anything about physiology or anatomy, when there is something the trouble with the engine, compare it with a person and see if you cannot think of the remedy.

A few paragraphs back I suggested that automobile illnesses may be divided into two classes, stomach and nervous troubles. Let us see just what I mean by these two divisions. If an engine stops or will not start at all, it is because it is not getting an ignition spark or because it is not getting the fuel. Suppose you are out in the country and the engine refuses to exert itself, or in other words, "goes on a strike." First look and see whether it is getting anything to eat or not. That is, be sure that there is fuel in the tank. Then see if the pipe line is clear between the tank and the carburetor.

It is an easy matter to find this out if the carburetor is fitted with a drain cock. All you need to do is to open



"A Medicine Feeder" for the Engine. A, Air Tight Tank; B, Inlet Tube; C, Tube to Manifold; D, Filler Vent; E, Bracket; F, Dashboard; G, Valve; H, Intake Manifold.

the drain cock and if gasoline flows from it, you can assume that there is gasoline in the carburetor. If, however, the carburetor is not fitted with a drain cock and there is no means for you to tell whether there is gasoline in it or not, try the following experiment:

Fill each pet cock with gasoline or if there are no pet cocks opening into the engine cylinders, remove the spark plugs and pour about half a teaspoonful into each cylinder. Close the pet cocks or replace the plugs, throw on the ignition switch and start the engine. If the engine runs a few explosions and then stops, the trouble is probably in its stomach.

It may be that the needle valve of the carburetor is stopped up, or it is very possible that there is dirt in some of the small gasoline passages in this device. Remove it from the car and clean it thoroughly. Before removing it, however, be sure that there is no trouble in the fuel line between the tank and the carburetor.

If after priming the engine still refuses to run, the trouble is probably in the ignition system. Some of its wires may be broken or some of the electrical units may be out of order.

You know that if the main nerves leading into your hand were cut, you could not move your hand. To a certain extent, the same thing is true of the engine. If any one of the wires is cut or broken between the ignition system units and the magneto or battery, then the engine cannot be made to operate until the wire is repaired or replaced. There are two kinds of "nervous systems" installed on automobiles: single coil and multiple coil systems.

The single coil ignition systems are fitted with a device in the primary circuit called a breaker box and a device in the secondary circuit to distribute the current to the proper cylinder called a distributor. The multiple coil systems are provided with a coil for each cylinder and a device called a timer which automatically brings into action or completes the circuit for each coil in succession.

The coils are connected so that the timer will bring them into action in the firing order of the engine. Either type or coil system is easily tested.

If after priming the engine it cannot be started, remove all the spark plugs, leaving them connected with their respective wires. Put them on their sides against the cylinder head and crank the engine. A spark should appear at each plug in succession if the ignition system is in condition and should the spark not appear, then remove each secondary wire and while the engine is being cranked, hold it about one-quarter inch away from the metal of the engine. If the ignition system is in condition a spark will leap from the wire to the engine.

If a spark is not obtained at the plugs, while the engine is being cranked, the trouble is at some other point in the ignition system. In order to explain the method for finding ignition troubles, let us consider the various types of ignition systems.

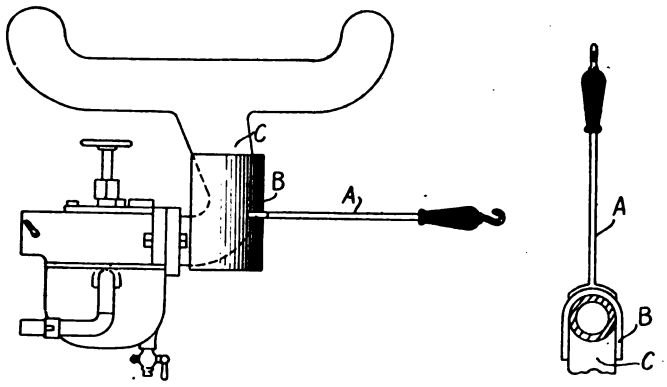
The Single Coil System.

First, the single coil system which employs a battery for the source of current! Remove the distributor cover and examine the breaker contact points. Upon turning the engine over, these contact points should touch each other just as the pistons reach the top of their stroke shortly thereafter. If they do not touch, adjustment should be made so that they will touch at the proper point.

With the spark fully retarded the points should come together just as the piston has reached the top of its

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stroke, in some cases; in other systems they are together at the top of the stroke, and separate after the piston has traveled one-eighth of an inch downward. In every case they should snap apart just as the piston has



A "Stomach Warmer." A, Handle; B, Iron Casting to Fit Manifold; C, Intake Manifold.

started on its down stroke. Adjust them so that when they are fully separated the clearance between them is approximately the thickness of a piece of paper or about .025 of an inch.

These contact points should be smooth and parallel with each other so that when they do come together, they touch across their full face. Turn the engine over until the contact points are together and remove one of the wires from the battery. Throw the ignition switch on and make a quick contact with the battery and the ignition wire which has been removed.

A spark should be had at this point. If not, indications are that the wiring is broken or disconnected between the battery and the coil or breaker box. It may be that the contacts are poor or that the wire is broken inside the insulation. Remedy this trouble.

There is one other possibility, however, and that is that the battery is not furnishing current. Take a short length of wire. Connect one end with one terminal of the storage battery and snap the other one across the other terminal quickly. Do not leave it connected as it will short-circuit the battery. The spark should be had when contact is made; if not, the battery should be replaced with a new one.

If in the first test a spark is had when the ignition wire is connected with the battery, put a piece of paper between the breaker points and try the experiment over again. In this test there should be no spark at the battery. If there is, it is an indication that there is a short-circuit in the line or one of the wires has been grounded. This short-circuited wire should be repaired or the break in the insulation covered to prevent grounding.

If it is found that the ignition system is all right from the coil to the breaker box, locate the secondary wire which leads from the coil to the center of the distributor. Remove this from the distributor and hold it about ⅛ of an inch away from the engine base.

Remove the piece of paper from between the breaker points and allow the points to come together. Snap them apart quickly and you should obtain a spark between the secondary terminal and the engine. If not, there is evidently trouble in the coil itself. Either repair this trouble or obtain a new ignition coil. If a spark is had, there is evidently trouble in the distributor. Clean this unit thoroughly with a cloth moistened with lubricating oil and wipe it dry.

See that the distributor brush functions properly and that all of the secondary wires are properly connected. After having made sure of this, make the first test again, when a spark should be obtained at all of the secondary terminals. If not, then the indications are that there is trouble in the plugs themselves.

Remove the porcelain and clean the plug with kerosene oil. Examine the porcelain for small holes or cracks.

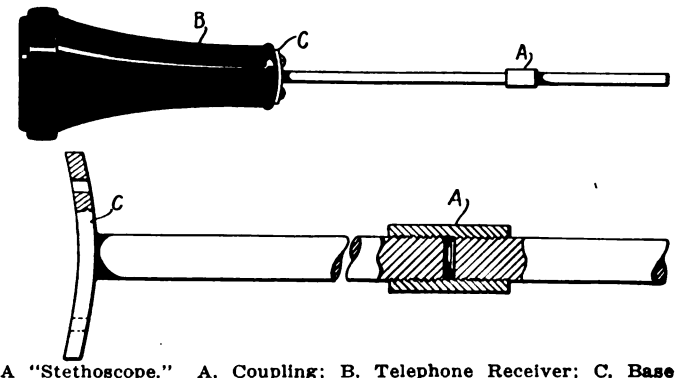
Multiple Coil Ignition.

If the system is of the multiple coil type, test the battery to make sure that it is furnishing current. Remove each wire in succession from the timer and touch it to the engine base. If any one of the coils does not vibrate, adjust the vibrator. If no current seems to pass through the coil, trace the wiring from the coil to the battery and also from the coil to the timer. Remove each of the coils that does not function from the battery box and see that the spring contacts touch the coils properly.

Make a secondary wire test as directed in instructions for single coil systems.

Magneto Systems.

There are two types of magneto systems, low and high tension. The low tension magneto systems are divided into two classes. Magnetos of the ordinary magnet type driven through gearing or by belts from the engine, and the Ford magneto. The latter is different from any of those and perhaps the easiest tested of all. Remove all of the spark plugs so that the engine may be turned



A "Stethoscope." A, Coupling; B, Telephone Receiver; C, Base of Rod.

rapidly. Disconnect the wire leading from the magneto terminal to the coil box at the coil box terminal. While the engine is being turned over, touch this wire to the engine base. A spark should be noticed, and if not, there is trouble in the magneto. Remove the plug at the

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top of the magneto and clean it with a piece of waste and sandpaper. You will note that this plug is fitted with a point and a spring. The point rests upon the magneto terminal plate inside the housing. Clean this plate by means of a screwdriver or a chisel and replace the plug.

Be sure that the spring is drawn out enough so that it forces the point down upon the magneto terminal plate. Try the first test again and see if the spark can be had from the brush wire to the engine base. If not, it is best to have the magneto repaired by an expert.

There is little that can be done with the second type of magneto. If the magneto is of the low tension type and a coil is used, make the same tests as you made with the single coil system. In any type of magneto always examine the breaker box first. Be sure that the contacts are clean and that the points come together across their full surface, and that they separate approximately 1/50 of an inch when the breaker arm is riding upon the cam.

Distributor boxes of magnetos require the same attention as a distributor box of any coil system. If the above procedure is carefully followed, one will have no trouble in finding out the reason for ignition line failures, and though one cannot always remedy the trouble one's self, it can usually be located.

Cleanliness is essential. Always remember that the secondary current, that is, the current which supplies the spark plugs, is of very high voltage and that it will travel across any oil or water-soaked surface. All contacts in the primary circuit must be cleaned and tight. Remember that a primary wire may break inside the insulation and the break go unnoticed. In testing out the primary system, replace each wire in turn by one which is known to be good.

If you find that the engine will run, but will not run on all four cylinders, but you cannot locate which of the cylinders is missing, short-circuit each plug in succession. You can do this with a screwdriver. Touch the end of the screwdriver to the cylinder head and bring the metal part of the screwdriver against the top of the plug. Note the action of the engine when this is being done.

If the action changes, you can well assume that the particular plug which is being short-circuited functions properly when the screwdriver is removed. One cannot always locate a missing cylinder by short-circuiting one plug, and if such is the case, short-circuit two of the plugs at one time. In this way, one can eliminate various sets of cylinders until the cylinder is found which is missing fire.

Spark plugs usually fail from either of two cases. Either the electrodes are separated too far or the insulation is broken down. The distance between the electrodes on a coil system should be approximately 1/16 of an inch or slightly less, while the distance between the electrodes on a magneto system should be between 1/32 and 1/16 of an inch.

Bear in mind that a spark may leap across this space when the plug is removed from the cylinders, but may not have strength enough to jump across when the plug is in place and subjugated to high compression. Examine the porcelain very carefully for breaks or holes.

A Stomach Pump.

I have spoken of feeding an engine with medicine and herewith is illustrated a device which most any automobile owner can make and use for feeding his engine with any sort of liquid, either for removing carbon or for starting it in cold weather.

Obtain a tin can such as is used for containing chocolate or cocoa, which is fitted with a tight fitting top, and in it punch three holes. Fit one of them with a short length of tubing which is punched through with a number of holes at its end and solder this tubing into place so that it extends nearly to the bottom of the tank. Provide the second opening with a tight-fitting screw cover, while the third opening should be provided with a long tube which leads to the intake manifold. This tube should be provided also with some sort of a shut-off arrangement such as a pet cock. This second tube should not extend into the tank, but be soldered to the cover only. The whole device should be made air-tight.

If it is filled with water to within about one inch from the top and the engine started when the pet cock is open, moist air is drawn into the manifold and the engine action improved. Water if used in small quantities has a tendency to drive off carbon and often increases the power of the engine. Kerosene oil or carbon remover may also be placed into this feeding arrangement to great advantage.

If your automobile has stomach trouble, one of the first indications is extreme carbonization. If you are feeding it too heavily the carbon will stay in the cylinders and cause lack of power. The engine will protest against overfeeding and voice its anger by emitting a sharp knock after it has been heated. This knock is caused by preignition and the overheating of the carbon on the piston head.

Knocks can usually be located by means of what I will term a stethascope made from an old telephone receiver and a number of lengths of steel wire fitted together by couplings. A drawing of this device is shown herewith.

Take a day off whenever you can and do something for the Red Cross, the Y. M. C. A. or the latest Liberty Loan.

Let customers lose their heads. If you keep yours you still have a chance to part with them on friendly terms.

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How To Place and Distribute Advertising So That It Will Give Results

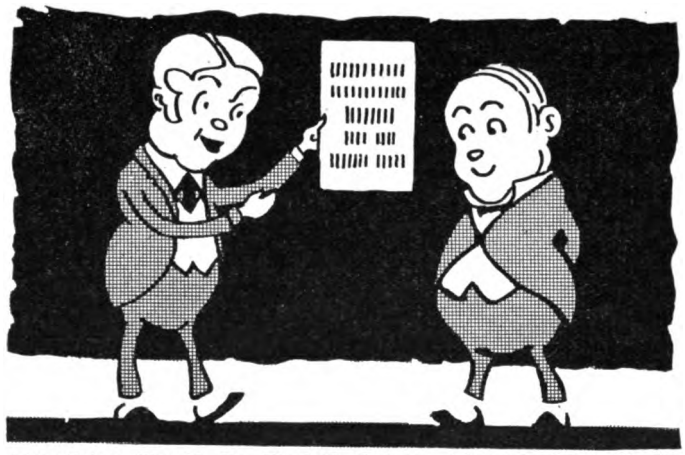
5—Prepare Your Advertisements Ahead of Time and Do Not Try To Use Long Headlines or Say Too Much in the Reading Matter

BY FRANK FARRINGTON
Illustrated by JATT

I HAVE already said considerable about making up the advertisement, but I want to begin back a little farther and take up the preparation of the "copy" or original draft of the advertisement as it goes to the printer.

Having decided what to advertise and where to advertise it, get ready to write the advertisement. Don't wait until it is time to take the copy to the printer. Do it ahead of time or else you will be hurried and make a poor job of it.

In order to have a carefully prepared advertisement for each issue of the paper, you ought to have several blocked out in advance and perhaps completed all the time. Last minute advertisements, like deathbed repentances, don't amount to much.



Advertising Should Be Blocked Out in Advance; Last Minute Advertisements, Like Death-Bed Repentances, Are Too Late.

You will find it difficult to write a good advertisement if you do it in a hurry unless you are experienced in the work. You will not get your money's worth out of your space if you put into it, hurriedly written matter which does not say what you want to say or in the best way.

The more inexperienced you are in advertisement writing, the more time you will have to give to the work, of course, but don't slight it. When you are new at it you will have to write your advertising over several times. You can always improve an ad by rewriting it. You will probably never get one so good that rewriting would not better it. That is true with the best ad writers. The trouble with the experienced hands making their ads in that way practically perfect is that they will not take the trouble to rewrite.

If you let the idea get into your head that you cannot spare the time to make up your advertising copy, you will fall down on the work. It must be given proper time or you will not get value received for the cost of the space you use.

In order to know more about newspaper advertising it will be a mighty good thing for you to study other newspaper advertisements, those of your competitors of course, to know what they are doing, and those of other advertisers to know what a good advertisement is. When an advertisement of something you are yourself thinking of buying appeals to you and makes you consider purchasing, stop and investigate the reason why it appeals to you. See whether you can make use of the same idea in your ad.

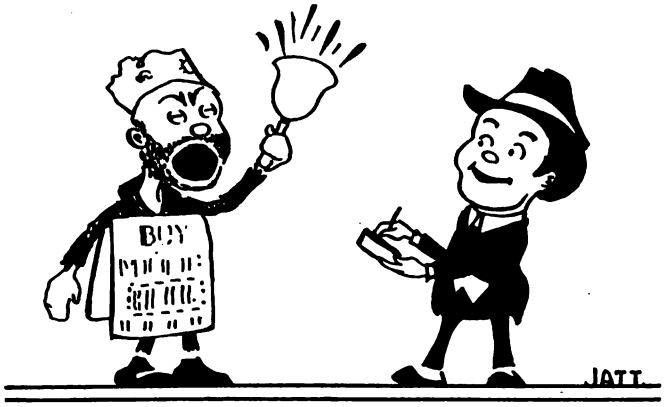
For example, you may see an overall advertisement that is headed, "Does It Irritate You?" Since sometimes you do become irritated, you stop and read the advertisement of overalls easy to slip on and easy to take off, the kind that do not irritate you by sticking, by tearing, by losing buttons or by some other imperfection.

That appeals to you as a catchy headline and you try to make use of it in your ad. You change it to "Don't Get Irritated!" and go on to say, "If your car doesn't give you the gasoline mileage you think it ought to give, don't allow the fact to wear on your nerves or on your pocketbook. Bring the car around and let our carburetor man take a look at it. Just a little twist of an adjustment may mean a couple of miles more to the gallon."

You may not want to copy ideas and sentences from advertisements in your home papers, but you may feel perfectly at liberty to copy whole advertisements of garages as you find them in the newspapers from another town. Wherever you find a good advertising idea, grab it. Keep a scrap book and put into it all the good ads you can clip. Or take a letter file box and put into it clipped advertisements properly classified. Instead of

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the alphabetical arrangement of the guide leaves, put on each one a subject, such as Repairs, Gasoline, Oils, Greases, Batteries, etc. Then keep clipped ads under these heads. When you want to advertise batteries, you



Jot Down in Your Vest Pocket Memo Any Good Ideas That Come To You About Advertisements.

know where to turn for sample ads. File all your own advertisements too for future reference and for repetition later if occasion demands.

Ideas are of the greatest value and you cannot always call them up in your mind when you want them, so file them. Don't be afraid to use the ideas of other men. You will find advertising ideas in your trade papers. Clip these out and file them too.

If you have a typewriter, your advertising copy will be much more welcome to the printer and he will be less likely to make mistakes in setting it up. If you write by hand, make your writing plain and see that there is no chance for a misquotation of prices. You can ask the printer to let you see a proof of your advertisement any time. It will be well, always, to keep a carbon copy of the advertisement as you send it to the printer. Then in case of an error it will be possible to place the blame.

While it may not be practical to see proofs of your newspaper advertisements only in exceptional instances, you will want to see proofs of any other advertising and you ought to learn how to indicate corrections in the proof. There are various little handbooks published which can be bought for 50 cents or a dollar, explaining about proofreading and proofreader's marks. It will pay you to get such a book. Ask your printer for a sam-



When You Are New at the Game You May Have to Rewrite Your Advertisements Several Times.

ple sheet of corrected proofs or go to the public library and get the information if you don't want to buy a handbook.

One of the first things you will learn about type matter is that the capital letters are referred to as "caps" and the small letters as "lower case." The latter term is due to the fact that where type is set by hand, as you have seen it set from cases by a printer on a high stool, there are two cases, the upper of which contains capitals and the lower small letters.

If you want a heading set in capitals, you will indicate "Caps," and if partly small letters, you will indicate "Caps and lower case" or "upper and lower" or the printer will understand "C. & l. c."

Any instructions you put on your copy, instructions to the printer, or instructions written on a proof sheet, should be put on with a red or blue pencil to show that they are distinctly not a part of the copy.

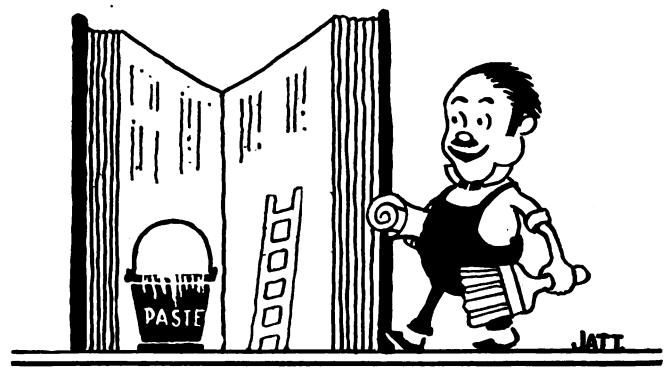
Capitals Are Harder To Read.

In regard to the use of capital letters, the inexperienced ad writer has the impression that the way to emphasize a line or word is to print it in capitals. Capitals are bigger, but they are harder to read. Take the following two lines, for instance, and note the difference in the ease of reading. The lower case matter is much easier to read:

THE BEST TIRES TO BUY ARE CORD TIRES

The best tires to buy are cord tires.

A headline set all in caps may be bigger than one in caps and lower case, but it is harder to read. If you



Keep a Big Scrap Book and Put Into It All the Good Ads You Can Find.

want to make it stand out more conspicuously, either use a larger size of type, or else a blacker face type.

In making up your headlines, don't make them too long. Four words of medium length make a line as long as the eye will take in without effort. You know how it is when you see three or four birds on a fence or three or four ducks in a pond. You don't have to stop and count them. You know there are four as soon as you glance that way. In the same way you don't have to stop to read:

Up Go Tire Prices!

You see at a glance what it says. You do not have to move your eyes along the page as you do in reading across a line of more words. Four words of average length are as many as the average eye can take in without moving. No doubt many people would not go beyond

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three without effort. Some might even hesitate at the third.

The moral of this is that if you want your headings to be taken in at a glance, make them four words or less, and set them in caps and lower case. Make it so easy that "He who runs may read."

The heading should not only be short. It should give an idea of what the advertisement is about. Any reader would recognize what the advertisement was about if headed, "Up go tire prices!" If it were headed, "With prices going up," there might be a good deal of doubt,



If You Use a Typewriter, Your Advertising Copy Will Be More Favorably Received.

and the man interested in tires would not be led to read on that account.

A form of advertising that always makes a hit if handled properly is that written in the first person. Many advertisers here and there throughout the country have indulged in the use of the first personal pronoun in their advertising and have made it pay. You may have the faculty of doing so.

When you talk in your advertising about yourself as "I" instead of "We," your readers visualize you. They think of you as a person, and if they know you, they picture you in their minds. "I" means something while the customary editorial "We" means very little. It simply stands for a business organization.

"This is the very best bargain in the second-hand car I ever had in my garage" gets over as it would not if it read "We" instead of "I."

"I" brings about a point of contact right away between the reader and the dealer. It helps to capitalize the dealer's personality. People remember how he has treated them and they recall his pleasant manner and his personal interest in their automobile troubles.

Where a garage is operated by a firm of two men, the personal factor can be developed by letting one of the men, ostensibly, at least, write the advertising. He can refer to himself as "I" and to his partner as "Tom," if that is his name. "Tom and I have decided not to raise tire prices until we sell out the stock we have on hand, bought before the raise."

Write all advertising carefully. Go over it thoughtfully and eliminate the words that are not needed. Cut out the sentences that add nothing to the information contained or to the appeal made. Tell only what the customer wants to know.

Then practice. Write an advertisement every day. Think over advertisement you may write. Jot down in your vest pocket memorandum any ideas that come to you for good headlines or for good sentences to use in ads.

You know your business and you know what your people want. You ought to be able to write better advertising for yourself than anyone can write for you.

SAVE YOUR TIRES.

Pay Particular Attention to the Small Cuts and Pin Holes That Sooner or Later Will Make the Tire Useless.

IF you should tear a hole in your jacket, you would probably take it to the tailor's very shortly to have it mended, not only because a ragged coat gives one a poor appearance, but because of the fact that the little tear would soon grow into a big one. Yet, do you pay as much attention to your automobile tires when they are cut or torn? I will venture to say that you do not. You run your tires over sharp rocks and glass without thinking of the consequences. At night when you drive your car into the garage you lock the doors and don't even give it the attention that you would a horse. There are a number of things that you should do every night before you leave the car, but I will only dwell upon the question of tire repairs at the present time.

It is of course impossible for one to drive his car only upon smooth ground or pavement. There will be times when tires must be driven over poor roads, and necessarily there is considerable wear on the treads.

Every little cut in the tire means a larger one shortly, unless it is attended to. Suppose you drive a tire over a piece of glass and cut through the tread a distance of one-quarter of an inch. The tire travels through a muddy place in the road and this little hole acts just like a suction disc. It picks up water and mud from the puddle and at the next revolution of the wheel acts just like a strong force pump. The mud and water are forced between the tread and the fabric.

After a short distance the cut grows to one-half of an inch in length and the tread is separated for a space of one-half an inch all around the cut from the fabric. A blister ensues, or else tread separation continues until the whole section of the shoe has been ruined. Water is not such a great enemy of rubber as is oil. The latter eats into rubber and softens it just the same as acid eats into rock. This is particularly true of the oil used upon roads, so that if you should drive a cut tire over an oiled road, the oil would work into the cut and shortly destroy the fabric as well as the tread.

Before leaving the car for the night always make a point to wipe off the road oil from the tires. Be sure that the tires do not stand in a pool of oil. If oil leaks from the transmission or engine, place a catch basin beneath the leak to prevent the oil from reaching the tires.

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Make a periodic examination of all the tires, inspecting them for small pinholes or cuts, and you will find that this procedure saves you much money.

All little cuts in the shoe should be carefully filled with a rubber cement and a paste-like mixture of soft, crude rubber and cement. If the cut is smooth it should be carefully cleaned with gasoline and a soft cloth or cotton waste, then the filling compound inserted. If the cut, on the other hand, is jagged and uneven with little pieces of rough rubber around it, the jagged edges should be pared off with a sharp knife before the filling compound is inserted.

Cleanliness in repairing tires is essential. Rubber cement will not adhere if the place to be patched contains dirt or grease. Do not expect a patch to hold if you apply it while your hands are covered with grease and oil, nor expect the filling compound to remain in the cut if the surfaces are covered with dirt and grease. Don't expect the tire to give satisfaction if you patch only the surface and leave the sand and water in a bubble between the tread and the fabric. Sooner or later the fabric will be broken down and a blow-out will result.

Anticipate blow-outs, and this is important. There is no reason why one should allow a shoe to be driven until the fabric gives way. If you know that there is a weak place in the tire you should insert some sort of a liner between the tube and the shoe to strengthen the tire. A blow-out often means a new tube.

Here is an interesting way for making liners, that not every automobile owner knows about. Take an old shoe which has passed its days of usefulness and with a sharp knife remove both beads, or if the tire is of the straight side type remove the retaining walls and cables at the sides.

Cut the tire across, into sections from ten inches to eighteen inches in length, depending on the condition of the tire as regards strength of the fabric. With a sharp knife separate the tread and breaker strip from the fabric at one end and clamp this end of the fabric into a vise. With the exertion of a little strength the tread may be torn from the fabric.

I know of no better liner than the strong piece of fabric taken from an old tire. The inside of the fabric has been smoothed by contact with the tubes, while the outside has just enough rubber in it to permit it to adhere to the inside of the shoe in which it is applied.

Among Mississippi Garages

Some of the Tools and Methods of Repair Adopted At Ford Service Stations Down in the Sunny South

BY JAMES F. HOBART, M. E.

THERE are some pretty "slick" garages to be found in the Northern States, but not *all* of the good repair and service shops are there, not by a good deal. The South has her large and increasing share, and I have seen some repair shops in the South which will make the North "go some" to equal! In Vicksburg, on a clay bluff 200 feet or more (rather more by the time I climbed up there) is a large brick building devoted entirely to the sale, service and repair of Ford cars.

Indeed, the sign upon the front of the building which bears the firm name of "The Powell Motor Company," also bears the legend, "Authorized Distributors of Ford Cars." The first or street floor of the large building, which is nearly square, is occupied by the office, show room and service department, the latter being in the rear, with entrance from the front at the end of the building farther from the office. There is also a rear entrance from the alley.

The second story is devoted entirely to shop purposes, a commodious platform elevator being located directly in front of the passage which leads from the front to the service room. Immediately adjacent to the elevator, upstairs, is located the "rear end" overhauling station, which contains the very convenient fixed trestle shown by Fig. 1.

This trestle is evidently "home-made," though I was unable to learn who was the designer and builder of it, the shop foreman stating that the trestle "was there when he came, and it would be there when he left, for it was a mighty good and convenient tool." The trestle was built of 1¼-inch steam pipe, the regulation fittings being used same as are employed for railings and machine guards in which pipe is used. The floor flanges were of the regulation stock pattern, and were fastened to the floor by four screws to each flange.

The flat bearing, A, had been bent up from a piece of ½ x 2 inch black steel and it was evidently oxy-acetylene welded to a pipe coupling. The semi-circular bearings, B, C and D, were simply tees, the top half of which had been hack-sawed off. These were of different sizes, the one at C being the larger of the three.

Rear-End Trucks.

In connection with this trestle small lever trucks were used for handling "rear ends." These little trucks being so made that, bearing a rear end upon them, a truck could be pushed right under the blocked-up car, and by pulling a couple of levers at the rear of the truck the "front end of the rear end" would be elevated just right to slip into its place. Fastened there the back of the "rear end" would be raised into place and the truck

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withdrawn, thus making very easy the matter of putting "rear ends" into place, and, working contrariwise, in removing them from the vehicles.

A Demonstration Magneto.

Upon a bench, close to the elevator, I noticed a Ford magneto mounted upon a shaft to which a crank had been attached so the magneto could be operated by hand-power and so the customer could familiarize himself thoroughly with the magneto and the manner of its working. In the other end of the repair shop was located a machine to which a magneto could be readily attached and power driven as found necessary. This machine was also used for "grinding in" crank shafts and bearings, of which more in a later paragraph.

The Power and Machine Equipment.

All the power machines in this shop were driven by a 10 H. P. electric motor which had been installed upon a bracket about six feet above the shop floor. The motor was large for the purpose of operating the "grinding-in" machine mentioned above. A single shaft, 1 7/16 inches in diameter and about 12 feet long, drove all the shop machinery, which consists of the "grinding-in" machine, a fine radial drill, a double-wheel grinding machine and an air-cooled air compressor, which worked into a receiver, made of boiler steel, and so large that the ordinary shop use of the several machines always kept plenty of air pumped up without ever having to run the motor for driving the compressor alone.

The air compressor was located upon a little shelf right in a corner where the side wall and rear wall of the shop joined. The compressor was placed high enough to be above the head of the tallest man who ever came into the shop. Thus, the motor and the compressor took no floor room whatever. The "grinding-in" machine, the radial drill and the two-wheel grinding machine stood in a row, backed against the side wall of the shop, almost entirely out of the way.

Fine Light Arrangement.

The grinding machine was placed next to the rear of the shop, just where the light from a large window fell full upon the wheel and upon whatever work was being done upon the wheel. The light came sidewise, enabling the workman to see just what he was doing. This manner of lighting a grinding wheel is far better than placing the machine directly in front of a window with the machine shaft parallel with it.

In such a case the workman must either face the light and be troubled by the glare and reflections, or, what is worse, he must stand with his back squarely toward the light and with his body between the light and the work. There is only one worse grinding wheel location than this, and that is—and is only too often found—where the grinding wheel has been tucked away under a flight of stairs so as to be "out of the way" (of light?).

The side light which came to this grinding machine was the best that could be given, and it surely was a comfort to work upon that machine, where a man could see exactly what he was doing, either while grinding a twist drill or when roughing the corners off of a rough casting. The radial drill, standing beside the grinding machine, also received side light—and plenty of it—thereby making accurate drilling a pleasure as well as a sure thing.

The "Grinding-In" Machine.

Right at the head of the stairs, four feet from the side wall of the shop, stood the "grinding-in" machine, by the use of which all new crank-shafts and bearings were fitted into their engine castings. This machine was a "store" affair, made for Ford use exclusively, but not by Ford, and sent out to all authorized repair shops as a part of the regular equipment.

Briefly stated, this machine consists of a cast iron base, carrying at one end a post, through which passes

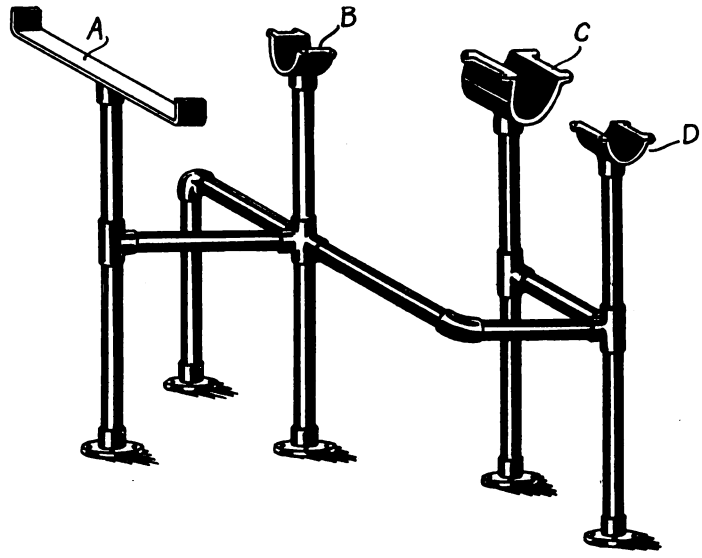


Fig. 1.—A Convenient "Rear-End" Ford Overhauling Trestle.

a shaft, terminating at one end in a universal coupling to which may be attached the crank-shaft to be "ground in." The other end of the shaft carries a fitting to which may be attached a Ford magneto, as described in a preceding paragraph.

The base of the grinding-in machine is fitted to receive a Ford engine case, with the cylinder head removed but with the shaft in place, the latter being bolted to the universal coupling mentioned above. The shaft carries between its two bearings in the post or column a pulley wide enough for an eight-inch belt, and the time required to grind in a crank-shaft is limited only by the power which can be applied through the belt in question

Method of "Grinding In" a Shaft.

About two hours' time is usually required for fitting a new shaft to its bearings, or for fitting new bearings to an old shaft. Nothing but oil is used during the process. The crank-shaft is rough-fitted to its bearings,

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the caps screwed down upon each bearing as firmly as possible and so as to permit the shaft to revolve under the 8-inch belt power.

Then the machine is started and watched pretty closely to see that no bearing gets too hot. Oil is plentifully supplied and the caps tightened as fast as possible without causing undue heating. Usually, in about two hours, the shaft or its bearings will be found to have been "ground in" satisfactorily and the engine may be removed from the machine and placed directly in the automobile to which it belongs.

By this method of "grinding in," no cleaning of shaft or of bearings is necessary after the process has been finished. There is no abrading material to be cleaned out of bearings, and, of course, there is none to be left *in* bearings through careless or improper methods of cleaning. As only oil was used during the grinding-in process, the engine is at once ready for its car without further work. This is a big thing when fitting a new shaft or new bearing.

Only a Short Shaft Necessary.

Owing to the well-planned and very compact manner in which the several machines were arranged in this shop, only a very short length of shaft was required, using little power in friction and yet making plenty of room between adjacent machines. The motor was connected between the radial drill and the grinding-in machine and, standing upon a wall bracket as previously stated, required no floor room.

The power was thus divided upon each side of the shaft which received the motor belt, thereby making necessary a smaller shaft than if all the machines were connected upon the same side of the motor. The bearings were placed on the shaft very near to the motor pulley and to the pulley which drove the grinding-in machine, and this also permitted a minimum diameter of shaft. In fact, the very simple installation of power in this shop demonstrated what could be accomplished by careful planning before any installing was done—something which should always be the rule when shop shafting and machines are to be set up.

Adjusting a Wheel Bearing.

Recently I watched a good workman put a new ball bearing into an automobile wheel, and the manner in which he worked seems well worth telling about. First, he filled the large bearing with heavy grease and carefully placed the eleven steel balls in position, the grease holding the balls in place and preventing them from falling out.

The workman then put the wheel in place, screwed on the cone, and adjusted it as correctly as possible. Seemingly it was quite correct. Then he put on the "tongue-washer" and screwed the nut home. Upon turning the wheel it was found to bind, whereupon the workman loosened the nut and backed up the cone a bit with a punch. He found that it still was too tight.

Then he took off the nut and removed the tongue washer, which he found did not hold but went around with the nut. It had been battered by some careless workman and had gotten so far out of shape that the tongue did not prevent the washer from turning around with the nut. The workman then placed the washer on an anvil and hammered the tongue, stretching it, after which he filed off all hammer marks and left the washer smooth.

The nut and washer were then replaced and found to hold, the tongue preventing the washer from turning around under pressure from the nut. This left the cone adjustment as it was made and the wheel was found to run easily but without any appreciable lost motion.

Putting In a Knuckle Pin.

One thing which this workman did was not the best practice, according to the writer's way of thinking. After the wheel had been put in place the knuckle pin was driven home. Seems as though this should have been done first, for it is very much easier done then than after the wheel is in place and you have to work through or behind the wheel to get at the pin!

Another point in his work which did not look good. When the castle nuts were put in place and the cotter pins brought out, he could not tell where the pin holes were and had to loosen the nuts in order to find the pin holes. In several cases the workman had to remove the castle nut again, and clean out the pin hole before he could tell its direction, grease and dirt having completely closed the hole in one of the pins.

When screwing castle nuts home it is always advisable to first carefully note the direction of the pin hole and to see that said hole is clean and free from all obstructions. Then the nut may be tightened right down, once for all, until the pin hole comes fair with one of the openings, and there never will be any doubt as to the location of the hole or its direction and you can "Fire when you are ready, Gridley," in the matter of inserting the cotter pins.

And there seems to be just about one correct way of inserting cotter pins after doing a setting-up job. But many workmen do not seem to use the proper way! Perhaps they have not realized it? The way in question is this: Do not put in a cotter pin here and there as you set up the nuts, but wait until all the castle nuts have been screwed home, leaving the pin holes exposed as above, then go over the work and put in the cotter pins, one after the other. In this way no cotter pin will be forgotten. They will *all* be put in place.

By placing cotter pins as above there is very little danger of omitting any pin, therefore there will be no unpinned nuts to get loose and come off; also the matter of placing the pins is done in far less time than when they are placed, one at a time, in a haphazard manner. Therefore, put on all the castle nuts, then give the "once-over" with the cotter pins, and the car will be surely pinned up in fine fashion, with not a pin forgotten or left out.

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Dieting the Carburetor

If You Want To Make a Record for High Gasoline Mileage You Must Know How To Adjust the Carburetor on Your Car

BY J. FRED GILMAN

EVERY so often we see accounts in the trade magazines and press of motorists that average thirty-five to forty and in some cases as high as fifty miles per gallon of gasoline. One always reads these articles and immediately becomes skeptical in his comments, because he does not understand just how it is done. It can be stated with authority that if he would take the trouble to look up some of these people or write them, he would find that such mileage is possible and can be had by care in driving and the proper attention to the engine of his car. He would also learn that a high average of mileage per gallon of gasoline is achieved through keeping the carburetor properly adjusted.

Carburetor First to Suffer.

Invariably, whenever the car develops the characteristics of a mule, the first object of attack by the driver is the carburetor. If the trouble is elsewhere, poor old carburetor has to worry along with its new adjustments be they good, bad or otherwise.

How many times have you been out in the country, riding easily along enjoying the beauties of nature, and when coming to a long hill you feel that the opportunity to "open her up a bit" is too good to be lost? You do so; everything is fine; the speedometer hand is slowly creeping towards its limit; you are about to skim over the crest of the hill, when to your disgust you hear a muffled "pop, pop" under the hood. The carburetor starts spitting like a frightened cat and the car immediately slows down, losing its power.

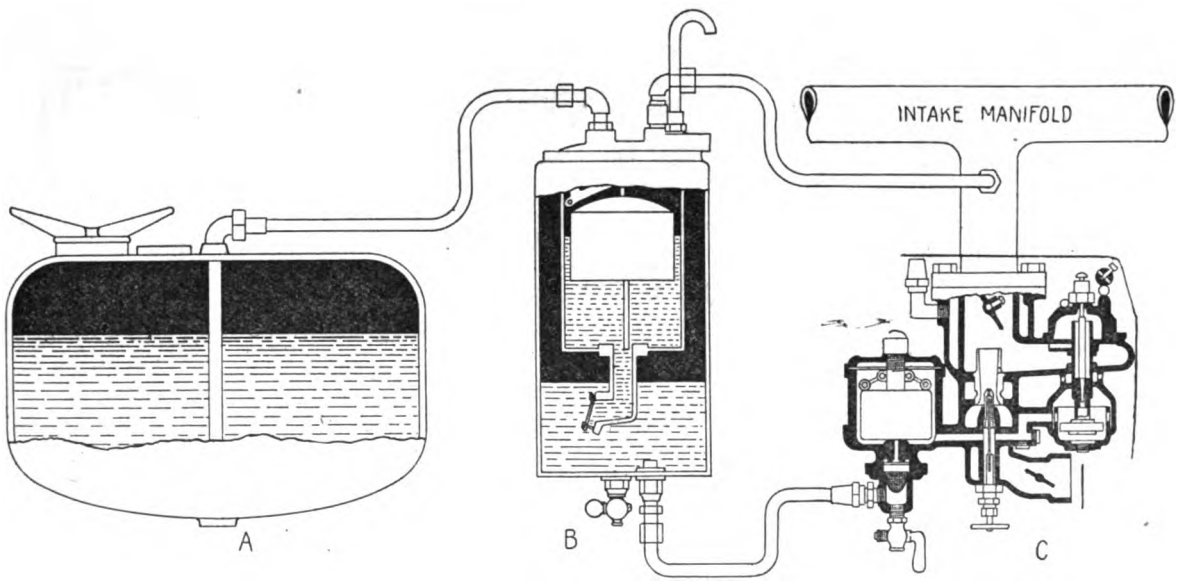
Sore? Certainly you are; but a loss of temper means that your energy is automatically switched to a useless flow of cuss words, and that won't fix your car.

Locating carburetor trouble is not necessarily keen detective work, but the method of "Look, Listen and Think" should be universally adopted by motorists. Of course, carburetor ills are very confusing because they are so much alike, but each trouble has a certain combination of symptoms that indicate that particular trouble.

Practically all carburetors have the same adjustments and will come under the following:

Turn the needle valve (if there is one) to the left one and a half turns and shut off any auxiliary air intakes or economizers or high speed nozzles, etc., in fact any other gasoline or air intakes except the low speed nozzle and primary air inlet. Prime and start the engine.

If the needle valve is open enough the engine will run on the primary gasoline and the air supplies—if too little gasoline the engine will back-fire or stop. Adjust the needle valve accordingly until the engine runs on primary air and the gasoline flows smoothly. Then advance the spark and give the engine more air through the auxiliary air valve (if there is one) until it backfires; then cut off the air until smooth action is obtained.



A Typical Fuel Feed System. A, Gasoline Tank; B, Vacuum Tank; C, Carburetor.

High Speed Adjustment.

You now have the following condition. A correct mixture of air at low speeds with plenty of gasoline; an auxiliary air valve which is ready to open as the engine

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speeds up—but does not open too freely; and closed high speed nozzles (if any) as well as closed economizer air inlets. And an engine running smoothly under these conditions.

Now open the throttle and accelerate quickly. If the auxiliary air inlet is too loosely adjusted, too much air will be admitted under the additional suction and the engine will back-fire. The auxiliary air valve spring must be tightened until acceleration takes place smoothly and easily. If there is a high speed gasoline spray nozzle, instead of tightening the auxiliary air spring open the high speed gasoline valve slightly until smooth acceleration is accomplished. The economizer air inlets (if any) are to be adjusted last with the engine fully heated and while the car is being run on the road.

The above directions will cover all makes of carburetors except the Schebler, which is fitted with another adjustment; the throttle-gasoline-needle valve arrangement. As the throttle is opened the needle valve is lifted and adjustment is had through two dials above the needle valve. With the engine throttled down the dial above the needle valve must be adjusted for idling and is taken care of as is the needle valve itself. As the engine is speeded up, the second dial is adjusted in the same way as is an auxiliary gasoline needle valve.

Use Your Nose.

In locating mixture troubles the most important point is to observe the exhaust, if it has a bad odor, or if the muffler emits dense clouds of smoke, generally black. This is a sure sign that the mixture is too rich and contains too much gasoline in proportion to the air.

This condition should be carefully watched in the small unventilated garage, for death has resulted in numerous instances from inhaling these fumes. Blue gray smoke coming from the exhaust should not be confused with black smoke, as this color smoke denotes excessive lubrication.

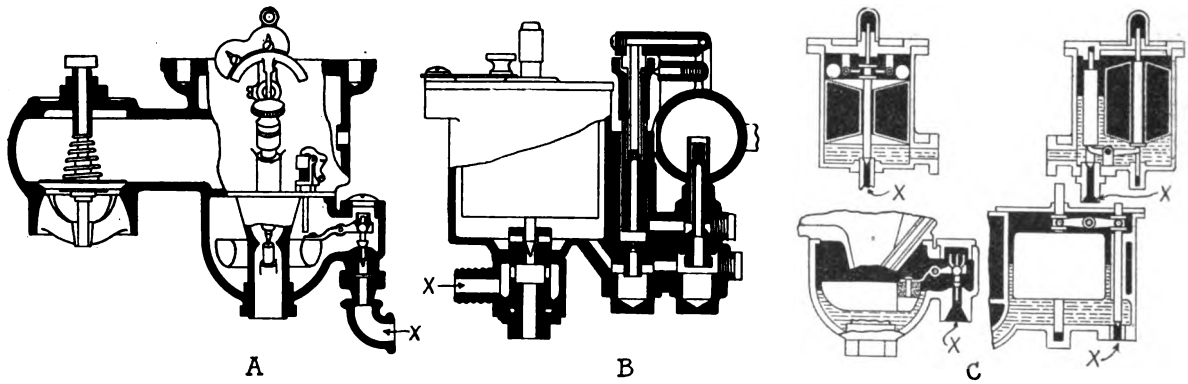
Note the flow of fuel from the tank to the carburetor. If it is of the simple gravity feed type, it sometimes happens that dirt collects in the filter to such an extent as to prevent a free flow of gasoline. In many cases a fine wire gauze is interposed between the float chamber and the tank to prevent the passage of dirt, sediment, or foreign matter which may be held in suspension by the fuel. This gauze may have become choked or perhaps the pipe itself has become obstructed, especially at an elbow, by particles of lint. The drive should be tested to make sure that it is unobstructed and that the gasoline stream is the full size of the orifice.

Particles of dirt may lodge between the float control valve and its seat, either constricting the opening and preventing a proper supply of fuel, or causing the valve to remain open and allowing too much gasoline to feed through. Another cause of failure is defective operation of the float.

Two Kinds of Floats.

Floats are made in two forms, either of cork or of light, hollow sheet metal. If the float is of cork it perhaps has become soaked with gasoline, which will cause the level of gasoline in the float chamber to rise too high. A metal float is liable to fill with gasoline through a minute leak and become too heavy.

A cork float should be removed and dried or baked, after which it should be thoroughly shellacked to prevent it from again becoming soaked.



A and B, Two Types of Carburetors. C, Four Types of Float Valves; X, Indicates Gasoline Passage.

The leak in a copper float is often hard to locate on account of its minute size, and it should be immersed in very hot water, as in this way the gasoline will be vaporized sufficiently to force its way out through the puncture and the spot can then be located easily by watching the bubbles. The float must of course be removed from the water the instant that bubbles cease appearing. It should then be soldered, using the least amount of solder possible to prevent it from becoming unnecessarily heavy, thus impairing its efficiency.

On most makes of carburetors there is an adjustment provided directly above the gasoline float needle valve for regulating the height of the float. If not (for instance as on the Schebler) the float arm can be bent up or down, as this will regulate the height of the float and at the same time govern the float needle valve.

On many carburetors there is a provision for hot water or hot air connections. In a great many instances these are taken off, or not put on at all. They are very essential, as the more heat introduced into the mixing

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chamber of the carburetor, the greater will be the increase in mileage and power.

The carburetor should be adjusted for a mixture rare enough so that the dash control must be pulled out until the engine is thoroughly warmed up, then pushed down to running position. This method will always insure maximum mileage with a minimum consumption of gasoline.

Use Your Brains.

Note the aforementioned facts carefully before you change your carburetor. The car owner who will take a ten-minute lesson at his service station and obey his instruction book will find that it not only makes it easier to do this work himself instead of stopping at a garage, but will also keep his engine running smoother and more quietly, and at the same time reduce carbon deposits and increase gasoline mileage.

In proof of how easily a half gallon of gasoline, costing fourteen cents, may be wasted in operating a car only a simple calculation is necessary. One half-gallon represents about seven miles of travel under the average road conditions. Cars which are heavy probably do not get this mileage on a gallon. When the car is stopped and the engine idling at 250 revolutions, about every two hours a half gallon of gasoline is wasted. Here is the necessity for proper carburetor adjustment.

There is a difference of about seven miles in the distance that can be covered with a gallon of gasoline with the carburetor in good adjustment as compared with poor adjustment. Assume that a car is driven fifty miles a day with an improper adjustment, there has been consumed four gallons at the rate of twelve and a half miles to the gallon, or if the carburetor had been properly adjusted the distance would have been covered in two and a half gallons.

An Economic Code for Gasoline.

Have the carburetor adjusted to utilize the leanest mixture possible. A lean mixture minimizes carbon deposits.

Stop all gasoline leakage. Form the habit of shutting off the gas at the tank or feed pipe when the car is not in use.

Don't run the engine while the car is standing. Cars are fitted with self-starters and it won't damage the battery if it is used frequently.

Don't use the car needlessly. Exercise forethought; errands can be combined so that one trip to town will suffice.

Don't expose gasoline to air—it evaporates and is dangerous.

Don't use gasoline for cleaning the engine and various parts of the car—kerosene will cut the grease just as well and it isn't as expensive.

Don't mistake cheapness for economy—the best gasoline and oils are the cheapest in the long run. Once owners know the first principles of automobile carburetion and the proper care of the carburetor, they will find that it is not hard nor difficult, and what is more, they usually develop a pride in being able to keep their car in first-class condition.

When out on the road, follow the car driven by an expert and note just why he maintains a constant speed. He does not drag along and suddenly dash away at forty miles per hour as soon as he sees a clear road. More gasoline is used when you accelerate quickly, and it should not be done more often than necessary. Find a safe driving speed and stick to it, making gradual speed changes only when they become necessary. Economy, like temperance, is moderation.

DRIVERS AND MECHANICS WANTED.

THE American Red Cross has issued a call for 1,500 drivers and mechanics for immediate overseas service.

A school is being established in Chicago at which the accepted men will be given a two to four weeks' course of study comprising mechanical operation and military discipline.

Applications are being taken only from men over 46 years of age or draft exempted men due to physical defects or deferred classification. A fundamental knowledge of the automobile is required. Special appeal is being made to chauffeurs, garage and repair men as well as the person familiar with the automobile.

Forty dollars a month and maintenance will be paid after sailing. While in training, half pay and maintenance.

Requests for applications should be sent to H. P. Harding, Director of Personnel, Automotive and Mechanical Section, the American Red Cross, 528 Peoples Gas Guilding, Chicago, Illinois.

A SAFETY FIRST DEVICE.

A Driver Seldom Loses Confidence in His Own Driving Ability, He Usually Worries About the "Man Behind."

ONLY a short time ago I read in the paper of a bad accident, caused late one evening in this city. It happened that an automobile was driven up one of the

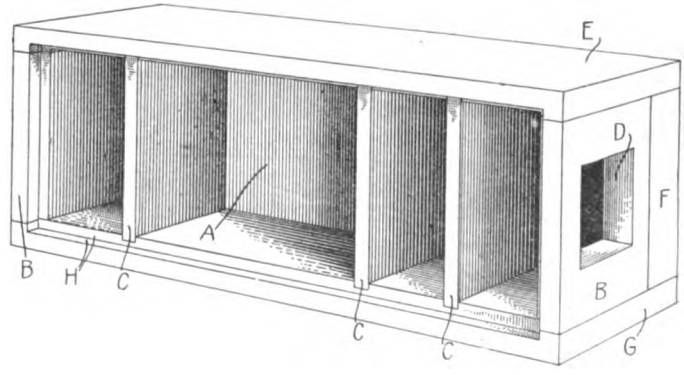


Fig. 1.—Construction of the "Safety First" Box.

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side streets and made a sudden swerve to the left at an intersecting street. A car immediately behind the first, took this occasion to pass, and drove directly into the rear of the first car. Two people on the rear seat of the front car were badly injured and the driver of the second car went to the hospital with a number of severe

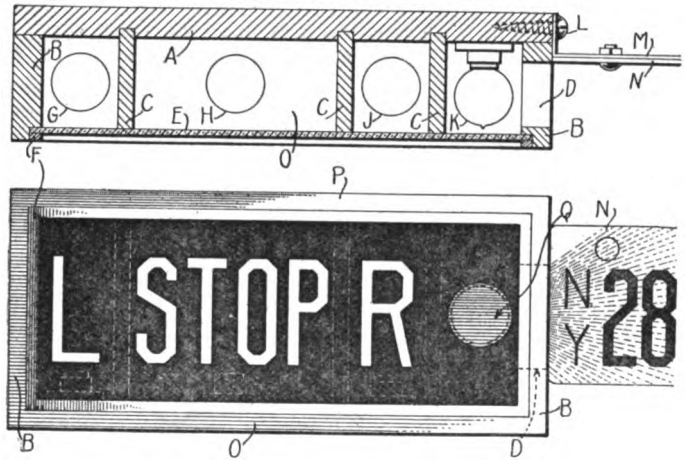


Fig. 2.—Plan and Back View of the Signal Device.

cuts upon his hands and face, caused by the broken windshield.

This accident would never have happened had the first car been equipped with a device such as is illustrated herewith. I have purposely designed this light so that it may be built very cheaply. Notwithstanding this fact, however, it may be made so that it gives a very good appearance to the back of the car, if properly constructed.

It consists primarily of a box measuring 9 inches in length, 4 inches in height and 2½ inches in depth, fitted with three partitions, as shown in Fig. 1 at C. The front of the box is solid, a hole is cut in one end, as shown at D, and a channel cut all the way around, as shown at H. In constructing this device the box is made first and a

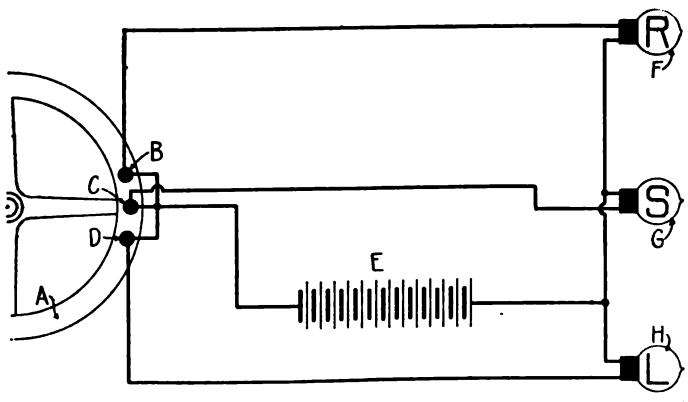


Fig. 3.—Wiring Diagram of Lights in Box.

piece of heavy glass fitted into the channel H so as to cover the back of the box completely.

This glass should first be coated with heavy black paint, then the letters "L," "Stop" and "R" scraped free from the paint, as shown in Fig. 2. The last compartment serves as a tail light and the circle, as shown at Q in Fig. 2, should be scraped free from paint also.

The circle Q should then be covered with red transparent coloring matter and the word "Stop" also treated in the same way.

This glass should be clamped into place by a square trimming piece, F. The top view and the rear view, as shown in Fig 2, clearly show the construction of the device.

The lights in the first three compartments should be fastened to the lower edge of the box, while the tail light is fastened to the back. A number plate hanger should be screwed to the front of the box, as shown at M and N. The tail light K is connected with the battery through the regular switch in the same manner that every tail light is connected, but the other three globes are wired, as shown in Fig. 3.

A three-button switch, or three ordinary electric button switches, may be mounted independently upon the steering wheel. A little pearl button measuring about ¼ inch in diameter may be obtained from any dealer in electrical apparatus. A grounded terminal, or outside terminal, of each button should be connected with one terminal of the battery, while a common wire to each of the lights should be connected with the other terminal of the battery, then the other terminal of each button should be connected with the other terminal of the light to correspond.

AN IMPORTANT UNIT.

Don't Think That You Can Slight a Grease Cup, Just Because It is Hidden Away Underneath The Car.

DOWN in back of the gear-set and flywheel or directly in front of it, but often hidden by frame members and body braces, is located a little piece of machinery that never gets its due amount of attention. This little piece of machinery seldom measures more than four inches in diameter and as many inches long, but upon it depends the operation of the whole car. If this little unit fails, it must be replaced with new or the car cannot go home under its own power—I speak of the universal joint.

The universal joint is nothing more or less than a clever combination of hinges which work back and forth approximately 72,000 times an hour. If you should run your car all day, these hinges would bend back and forth 576,000 times. Just imagine how many times they function in an entire season, but do you ever think of putting grease in the little grease cup which supplies the universal joint with lubricant? I will venture to say that you do not, or if you do, you only apply the grease perhaps once a season; you neglect this duty just because the

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grease cup is so hard to reach. Even the hinges on a door require oil occasionally and they are seldom used more than 1/1000 as much as the universal joint on your automobile.

If the joint is surrounded by a case which is practically oil tight, and if the lubricant which goes into this case supplies the joint only, use a medium grade of grease. There is no reason for using a heavy cup grease at this point. It will simply harden and the joint will not receive sufficient lubrication.

I think it is safe to say that 90 per cent. of the knocks which occur seemingly in the gear set may be traced to the universal joint, and these knocks are caused by worn universal joint parts.

There is another reason why you should keep the universal joint in condition. Suppose that the joint has a play of one-quarter of an inch. Then when the clutch is engaged, power is transmitted to the universal joint and the resultant back lash wracks the rear axle and strains the engine. If there is an excessive amount of play in the joint therefore replace it with new, or at least replace the worn parts, else you may be called upon to replace both the joint and some of the gears in the rear axle.

The Construction and Repair of Radiators

Part 2.—The Methods Used for Repairing Ordinary Tubular Radiators, Removing the Tubes and Replacing the Fins

BY M. J. HENNESSY, M. E.

NEXT in order of precedence to the Honeycomb radiator is the tubular type. While this is without doubt the oldest form of radiator in use at the present time, its development for some inscrutable reason is comparatively recent. Owing to its simple construction, I believe that the time is not far distant when the tubular radiator will come into general use and gradually crowd all the other types out of the market.

While there are many details of construction in which one tubular radiator differs from another, the essentials are the same in all of them. The principal parts are two plates, called Header plates, shown at E and F in Fig. 1. The Header plates form the top and bottom of the core. The core itself is formed by tubes D which pass through the holes in the Header plates and are soldered fast on the outside ends. The fins are simply strips of thin sheet metal doubled to add to their rigidity and soldered along the side where the two edges come together; holes corresponding to those in the Header plates are punched in them and they are passed over the tubes.

The ends of the fins are soldered to the two sides of the core in order to keep them properly spaced. The sides B are simply two pieces of sheet metal, the ends of which are turned to form a seam with the Header plates and their sole object is to form a spacer for the fins. They have nothing to do with the water. The foregoing description applies to the ordinary type of radiator. Incidentally, this is the most popular form of the tubular radiator with which you will come in contact in the general run of repair work.

The Radiator Tank.

The next part of this radiator is the tank, or frame; that is the top and bottom of the radiator shown at A and C. This varies with the type of car it is to be used on. For a passenger car these parts are made of sheet metal, along the same lines as I have already described in the article on Honeycomb radiators.

For truck use, what seems to me to be a more sensible course, has been followed, and is fast coming into general use; that is, a cast iron frame. It is made of four pieces, a top and a bottom section, which form the tanks, and two sides which are only used as connections and supports for the top and bottom section. Sketches of these sections are

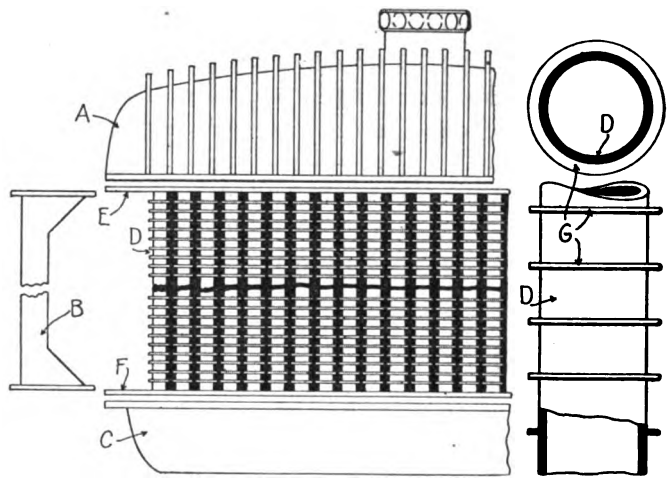


Fig. 1.—Sketch Showing Component Parts and Their Relation, of a Typical Tubular Radiator.

shown in Figure 1. Two cork gaskets are made to correspond with the two Header plates of the core. These are placed on the top and bottom plates and all five sections are bolted together.

In making repairs to a radiator of this style, it is well to remember that you can test it conveniently only when it is completely assembled, so you will do well to locate all of the leaks before taking the radiator apart. This is not as difficult as it would seem for the reason that when a tubular radiator leaks, it is, in nearly every case, the

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result of an abrasion on the outside and is in consequence easy to see.

As a rule, unless the work is done by an expert, some difficulty will be experienced in soldering the test patches to the cast iron openings. If you have this trouble, you had better have a couple of pieces of radiator hose to fit the pipes. You can close the outer end of the hose with a piece of wood which has been turned down to size in a lathe. If there is no lathe at hand you can get the same result by using two flat pieces of wood about two inches wide clamped across the hose by a wood screw or stove bolt each side of the hose.

When you have a filler cap which screws on you can make it tight enough by putting a gasket under it. In the case of a hinged cap there is no way out except to solder a plate over it as described in the previous article on this subject.

Having tested the radiator and marked the leaks, the next thing to do is to take off the frame. If the job is of the bolted together type, this is also a simple matter. You will find one or two extra large bolts in each corner of the radiator. By removing these you will release the two sides of the frame; now take out the two rows of small bolts at the top and bottom and you can lift the two castings off, leaving the core free to work on.

Repairing Damaged Part.

We will suppose now that the radiator has been hit by something leaving a damaged space on the face of the radiator about four inches square and about an inch deep. As the tubes are set about one inch apart, we will have from three to eight of them to repair.

If the fins are not crumpled too badly you may be able to remove the tubes without cutting the fins. It is better to try this first. To remove the tubes, insert hot soldering iron in each end and hold it there until the solder lets go. The tube should now pull right out of the core. If you succeed in removing all of the damaged tubes in this way it will not be difficult to straighten up the fins. The material of which they are made is very pliable and with a little patience and perseverance you can bring them back to their original shape.

You may find, however, that the fins have been so battered by the object with which the radiator was damaged, that they will not allow the tube to pass. If such is the case, you will have to cut them. When you cut a fin try to cut it about midway between two tubes. Don't cut any more of them than you have to as it requires nice work to make them look right when they are repaired in this way.

Having removed the broken tubes in one of the above ways, the next step is to put in the new tubes. You can buy these tubes cut to the exact length from the maker of the radiator. In buying them from the maker you are sure also that they will be the right diameter, and this is of real importance, as it is absolutely necessary to have a good tight joint in the Header plates.

If the tube rattles around in the place you need never expect to make it water-tight. It can't be done. If you want a good, tight tube, first see that the sockets in the Header plates are perfectly clean and thoroughly coated with good, clean solder. Then see that the ends of the tube are in the same condition and that they are a tight fit in the sockets. Now coat the parts to be soldered with the soldering acid; push the tube into place and apply the heat by means of the soldering iron and see that the solder runs freely all around the joint. If you follow these directions to the letter you need not worry about leaks. It is the apparently trivial detail that makes or mars the successful soldering job. Solder positively will not stick on anything but *clean* metal.

Replacing the Fins.

Having soldered the tubes into place you will now have to replace the portions of the fins which you removed. The common practice is as follows: Take a thin pointed instrument and spread the cut ends of the fins enough to allow you to clean and tin the inside edges, cut off a number of pieces of sheet copper, brass or tin plate, have them about one inch long and a half inch wide, tin them and insert in the ends of the cut fins, then squeeze the ends of the fins together and solder.

In the majority of cases you can then take those portions of the fins which were removed, straighten them out and by cutting notches in them instead of the holes you can slip them in over the tubes and solder them to the plates which you have already set into the main part of the fin.

If you exercise sufficient patience and put the proper amount of solder on this part of the job, a customer will have extreme difficulty in locating the exact place that has been repaired. It is customary among the regulars in this line to give the whole core a coat of paint when the job is finished. This custom does not, of course, make it any easier to find the place. At the same time it is but just to say that there are a great many men in the radiator repair business who can take a tubular radiator that has been badly battered, and without putting a new tube into it, or without disturbing the frame, leave it so that it would require an expert to locate the place which had been repaired, simply by the splicing methods, which I have explained in detail in regard to the fins.

I do not recommend this method for those who have had only a limited experience in the field. They will find it much better to stick to the method which I have tried to make clear in the foregoing.

Assembling the Unit.

In assembling the radiator, use a good sheet cork for gaskets. *Don't try to use the old gaskets.* It does not pay. Use the gasket dry. If it is made right and fits properly you do not need any messy shellac or white lead coating. Place the core on the bench or stand it

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with the bottom up. Set the gasket in place on the Header plate; set the bottom tank on the gasket, insert *all* of the bolts, and tighten them up. Don't put on a single nut until all the bolts are in place, and when you start to tighten them up, pull them up evenly and *pull them tight.*

Put the side members on next, simply starting the bolts in their places. Now turn the radiator right side up and attach the top member, using the same method as you did with the bottom. Last, tighten up the corner bolts and the radiator is ready for the car.

There is another type of radiator which is distinctly worthy of mention. I refer to what is known as the cellular type. It is the simplest radiator to repair that I know of and in reality is a horizontal tube radiator. It is practically all tubes, the tank portions being there only for the purpose of accommodating the inlet, outlet and filler holes. It consists of two large plates which form the back and front of the radiator. The edges of these plates are turned to form a seam, with a band which runs around the entire radiator. The face plates are filled with holes, set so close together that one wonders how they are kept apart, and in each of these holes is a copper tube, running from one plate to the other. To repair this radiator, you have but to insert a soldering iron in the offending tube, remove the tube and replace it with a good one, and the job is finished.

A neat temporary repair can be made by simply pushing a small cork into both ends of the tube.

Valve Clearance and Efficiency

An Engine Will Never Give Satisfaction Unless it is Kept Properly Adjusted, and the Valves Are Important Members

BY WM. H. STEWART, JR.*

FEW automobile owners, unless they have carefully educated themselves, know but little about their cars. They may know how to keep the body looking well, how to throw on the ignition switch, and how to shift the gears, but as soon as anything goes wrong with the engine they are absolutely helpless and are obliged to call in an experienced garage man for assistance.

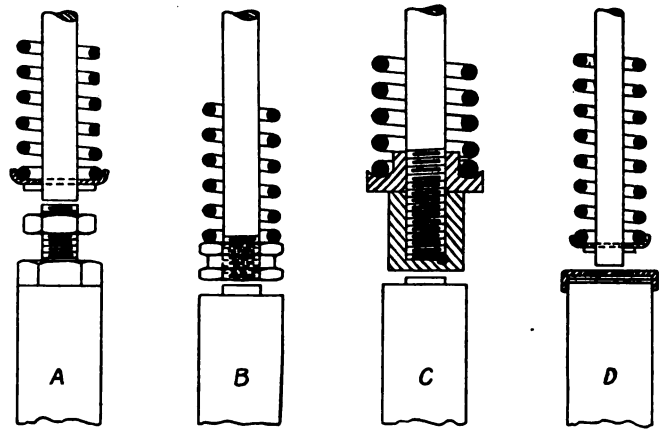
Every car owner owes something to himself. He has invested considerable money in his machine, and he should know how to keep it in order, how to get the most power from it, and how to prevent depreciation, as much as is in his power. Invariably, when two or more car owners get together they are prone to boast about car mileage.

One obtains fourteen miles from a gallon, the other sixteen. They own the same type of car and the fellow who owns the car giving the best results is very prone to boast to the other one. The owner who does not get the mileage, usually dismisses the argument by saying, "Well, my car was a lemon anyhow."

There is an old saying that the leopard cannot change his spots. Let me amend this statement slightly as applied to automobiles by saying that any man can make a "lemon" out of a "peach." Perhaps this statement sounds just a little bit slangy, still it conveys the idea which I wish to impress on every car owner's mind.

When his machine comes from the factory, it is supposed to be mechanically perfect, as far as human ingenuity can make it. All of the parts have passed through the hands of one or more inspectors whose sole business is to see that these parts are perfect. In many cases these parts are calibrated to less than .001 of an inch in size.

The assembled machine must pass a very rigid test, and since it is made just like all of its brothers and sisters, so to speak, one can assume that it is as good as all of the other cars made at the same time or upon the same model. The car is in good condition when it leaves the factory. It only remains for the car owner to put it in poor condition, and he can do this very easily if he is ignorant of the mechanical principles of the machine.



Four Types of Valve Adjusters. A, Lock Nut on Tappet; B, Lock Nut on Valve Stem; C, Special Fitting on Valve Stem; D, Tappet Cap for Ford Valve Adjustment.

As an instance of what may happen to an engine, providing the operator does not know anything about it, let us consider in this article valve adjustment.

The majority of engines on the market today are fitted with what are termed poppet valves. These valves are operated through push rods or tappets by a cam-

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shaft and opened at the proper intervals by hills upon the cams. When the piston starts on its down stroke, or shortly after it starts, in most cases, the cam on the shaft lifts the tappet, which in turn pushes on the valve stem and lifts the valve away from its seat, admitting fresh gas to the cylinder. At the end of the piston stroke downward, the cam permits the tappet to drop back into place and the valve seats again to prevent the passage of gas from the cylinder into the manifold.

The piston goes upward on the compression stroke, the explosion takes place, the piston is forced down again and shortly before the bottom of its stroke the exhaust valve is opened by a cam and the tappet, in a similar manner to that of the inlet valve.

The piston goes upward on the exhaust stroke, forcing the gas through the valve port into the exhaust pipe.

The valve lifting mechanism, therefore, consists of two rods, a tappet and a valve stem which may vary in length on different engines, but average about six inches, that is the distance between the valve and the cam is usually at least six inches. As the engine heats, these rods naturally expand, and if the valve lifting mechanism were all one piece, the valve might be held open at all times because of the lengthened metal.

To prevent this, a space is provided between the tappet and the valve stem. This space is called the clearance. Now let us consider the two things necessary for good valve action.

When an engine is traveling at a rate of 1,000 or more operations a minute, the piston speed is very rapid, the valves are held open an extremely short time. Suppose that the valve clearance on the intake valve happened to be extremely large. The push rod would rise upon the cam and just barely lift the valve. With such a small valve opening, only a small portion of gas could be drawn into the cylinders. The result would be the same as if one were to keep the throttle partially closed at all times.

Suppose the clearance in one cylinder were large and in the rest of the cylinders the clearance was approximately correct. One cylinder would lack power whereas the others would give maximum power at a certain throttle opening. Uneven engine action would result.

Let us assume the other extreme. Suppose the valve clearance were very slight. One engine might be started cold and the action would be even. As the valve mechanism heated and the rods expanded, the valve would be held open at all times, and if it were an inlet there would be great danger of fire passing back through the carburetor and igniting the gas in that unit.

If the valve were an exhaust, the gas would be forced out through the exhaust on the compression stroke and there would be a great lack of power because the compression would thereby be very low indeed.

Obviously, then, there is a certain valve clearance that gives the best results under certain conditions. Since average conditions are had when the engine is warm or after ten minutes of driving, the valve clearance should be adjusted, not while the engine is cold, but when it is warm. Another obvious fact is that this valve clearance should not be greater than necessary to provide for valve stem and tappet expansion. The clearance should not be greater than .003 of an inch after the engine is heated.

This amount of clearance can be determined by inserting a feeler gauge or by lifting the valve tappet when the valve has reached its lowest position. There should be just enough clearance between the valve stem and the tappet when the engine is warm for one to feel it with their fingers. When the engine is cold, however, this clearance should be more noticeable and often as great as 1/16 of an inch.

Practically all of the cars on the market at the present time are fitted with valve adjustment devices whereby one can control the valve clearance. The Ford car, however, is an exception to this rule and the question frequently comes up as to how the valve clearance on this car may be adjusted. After a few thousand miles running, the valve stems are worn and the valve clearance increases. Naturally this results in a loss of power and excessive carbon deposits in the cylinders because the exhaust valve does not open far enough.

There are two methods of valve adjustment open to the car owner. The first one entails a little work and is not always satisfactory, but merits description. Remove the valve and with a hammer "stretch" the valve stem, that is, place the valve stem upon a heavy piece of iron and pound upon the circumference of the stem all the way around until the stem is lengthened the required amount.

In doing this, however, be very careful not to pound on the portion of the stem which passes through the valve stem guide. The stretching should take place just above the valve spring pinhole. After the valve stem beneath the hole is pointed, its diameter is decreased and the wear is much faster.

The second method is the placing of caps over the tappet ends. These little caps are made of hardened steel and may be purchased at practically any Ford station. They are so arranged that they fit the tappet ends closely and as the valve stem wears the caps may be lifted off and small thin washers placed beneath them. The washers are a few thousandths in thickness, and lift the cap, thus decreasing the clearance.

If you are interested in the running of your engine, if you want to obtain maximum mileage, if you want to keep the engine quiet, and if you don't want road trouble, keep the valve clearance correct. It is one of the details that often escapes notice, but is of extreme importance.

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*President, Stewart Automobile School.

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Yankee Bill's Idea of Business

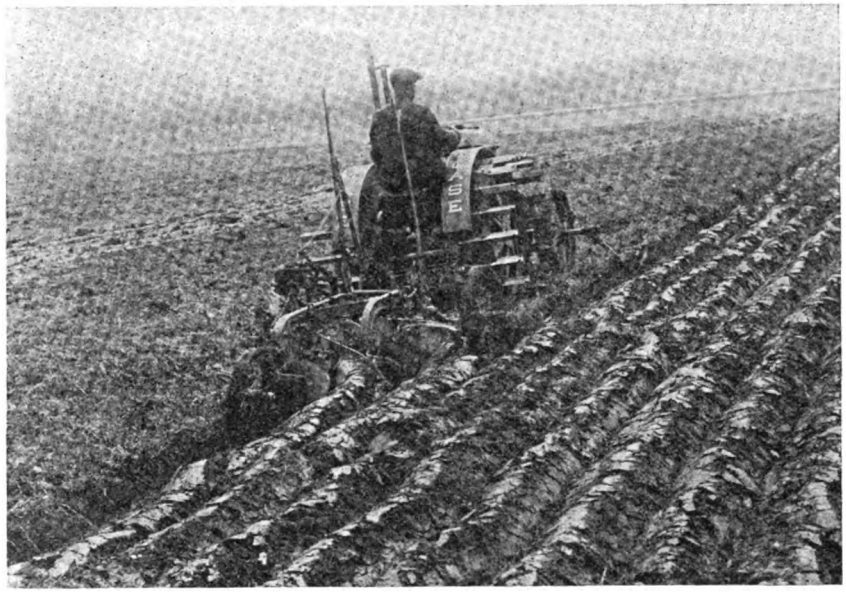
The Old Adage, "Every Cloud Has a Silver Lining," is Surely True at the Present Time. Read What a Middle Western Garageman Says

BY F. L. PHILLIPS

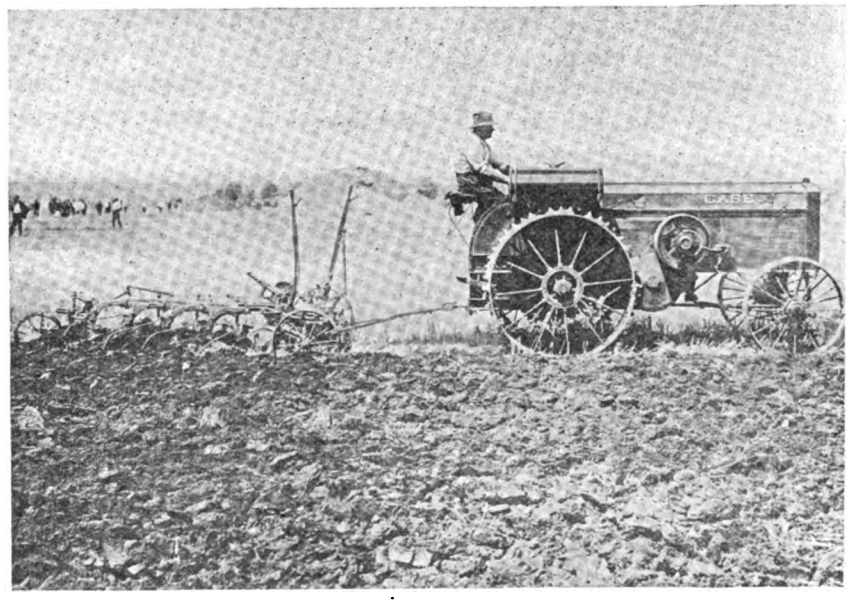
"FOOD going up, taxes going up, coal going up, and business going down"—but I was interrupted at this point by the explosive utterance of Yankee Bill who burst out with "Say where did you get that story from anyway? This hammer is a bit too heavy to throw at you and I didn't want to hurt my arm or take a chance at missing you and breaking a window, but you're all wrong, mister, you're all wrong. When anybody tries to tell you that business is going on the bum, you can either put them down as slackers or idiots, because they don't know what they're talking about."

Before I continue my story a little word of explanation is perhaps best. Yankee Bill is a well-known garage man in Wisconsin. They call him "Yankee" because he comes from Connecticut, and because he says that "one ounce of Yankee ingenuity is worth more than a pound of Western brains."

"Yankee" always resents the inference that business



A Case Model 9-18 Tractor Hauling a Two-Bottom Plow in Heavy Soil. Work that Can Be Done at a Rate of Speed Greatly In Excess That of Horses and at a Lower Cost, Particularly Upon Large Fields and Long Rows.



A Case 12-25 Tractor Hauling a Gang of Plows Through Fresh Stubble, a Job that Would Require Two Horses and Two Men Can Be Done By One Man in Half the Time. Surely a Great Saving in Time and Money Is Shown.

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is poor and I knew that unless I roused his ire a bit he would be too busy to talk to me any length of time, so I took a chance at the hammer and spoke as I did.

After delivering himself of his first remark, "Yankee" straightened his back like a watch spring, uncoiled his long legs from around a wheel and pulled himself from beneath a "contraption" which he was working on. I immediately placed one hand upon the knob of the door for safety's sake, and tried out my most winning smile which seemed to propitiate him a bit. At any rate, evidences of personal danger abated and he condescended to let loose a few more remarks in my direction.

"You know you fellers from the East make me tired. Out along the Atlantic you seem to think that the automobile business is all going hang just because somebody says that we can't get the metal. You seem to think that the whole United States is going to stop work just because that dern fool over in Europe is shooting off a gun or so. When the Yankee boys get over there, so that there is about one Yank for every hundred Huns, there won't be any war, there'll be nothin' but slaughter, and our boys will be the fellers to view the remains.

"There won't be any chief mourners either. I can't see how any automobile man is going to suffer this coming season. I don't know as I care whether I ever see another automobile or not, as far as business is concerned. I can do all the business I want to, simply by selling tractors and keeping them repaired. Look at this dern thing I've been working under all day. Yup, it's a tractor, or at least that's what the salesman called it when he unloaded it in this town.

"My name for it is 'big business.' It's one of the first ones ever put out and I don't think the owner would sell it or trade it for my bank account. He keeps the thing whizzin' along night and day almost, he doesn't give it any rest, and he uses it for everything except picking off potato bugs. He says he could gas 'um if he could only use the poisoned gas from the exhaust on his potato field.

"You see it burns kerosene oil, and believe me, he doesn't have to tell you about it. All you need to do is go out in the field with him some day when the thing is running.

"It ain't the only tractor he owns either. He just bought another one last week, or at least I bought it for him so that I could collect a commission, and he is as tickled over the new tractor as he would be over a new baby. He just made some comparisons 'tween what the new tractor could do and what he could do with this old machine shop, and found that the new machine would do just about twice as much work as the old. Still he hasn't any kick comin'. The old one does three times as much work as his horses did. Besides that he don't need so many men to run it. Of course he needs me, but then I don't count.

"The old tractor takes one man to run it and two men to keep it busy. That is where I come in. Since I started in business in this town I have sold ten tractors and since I sold them I have been one busy man! Ordinarily my automobile repair work keeps me busy, but since the tractors began to come like hot cakes, I have been making more money than ever before.

"Business poor? Not on your life! Not as long as the Government will let manufacturers turn out tractors and trucks, and I understand that Uncle Sam doesn't intend to stop the production of farm implements for some time yet. The boys on the other side need something to eat and as long as we can get the machinery over here I guess we can keep a stream of food going.

"Do you think that the farmers are as satisfied with tractors as you are?" I asked, for I was particularly interested in what the general attitude was in the West.

"Let me tell you of one instance that I know about. You can verify anything I tell you from Leon Wilson. He owns a farm about a mile up the road. Wilson has got about the best farm that I ever saw. I guess he owns as much as 200 acres of land.

"Last July, after all his crops were in the ground, every last one of his hired men up and struck. Leon is a cranky old cuss, and just like a balky 'long ears' in some respects; he wouldn't give in and the result was his hired men hung around two days, then left for parts unknown.

"For a week, Leon was sweatin' blood. He came down here one day and moped around like a hen with the pip. Then he went back and wrastled with the weeds and the bugs and other pests. I saw him one evening, long 'bout ten o'clock, chasing potato bugs with one of these here little flashlights. I guess he would have gone 'bugs' himself if I hadn't put a 'flea' in his ear."

At this point of Yankee's narrative, he was interrupted by an automobilist who came in for a tube, for Yankee carried accessories along with his regular line. He seemed to be a "Jack of All Automobile Trades" and believed in picking up every dollar that was wandering about without an owner. The unsuspecting autoist intended to buy a tube only, but left with a new tube, a box of tire talc, one dozen cementless patches and an extra special bargain in the shape of a new shoe. (Yankee knew how to sell things.)

"But the flea I put in his ear kept biting him until he woke up," continued Yankee, just as though he hadn't stopped at all. "And at the end of the week Leon stopped down to see me. We put our heads together and managed to scrape up enough cash to buy a tractor.

"It just happened that I had ordered a tractor, about a month before, for a farmer and I arranged with him

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so that I could sell that machine to Leon, and hold off delivery to him for a spell longer.

"Leon had managed to get hold of a hired man by this time and together they made a fight with the weeds. They kept the tractor running night and day, until they began to catch up, then 'twas easy; that is, 'twas easier than before, but they worked like horses and if it hadn't been for the tractor I guess Leon would have lost some money on his farm. He's got a couple more hired men now and looks like easy sailing until harvest time.

"Well, if I don't get busy on this farm bus, I'll get poisoned with paris green if the old man catches me."

The Use of Kerosene As a Fuel

Heavy Fuels and Illuminating Gas Have Been Used for Some Time in England and These Fuels Have Proved Very Practical

BY SYDNEY F. WALKER, M. E.

KEROSENE, or paraffin, as it is called in the United Kingdom, was used to a small extent in the very early days of the motor car. In 1900, when a trial run from London to Bristol was undertaken, to see how the cars of that day would stand the continuous work, one of the cars was run on kerosene, and apparently did very well; all the other cars were run on gasoline.

Before the advent of the motor car, kerosene oil engines of the stationary type had been running in the United Kingdom for a long time. When gasoline began to rise in price, a few years before the war, attention was directed again to the possible use of kerosene for motor cars; and the writer understands that some of the motor busses in London tried out this fuel.

The difference between gasoline and kerosene, as all are doubtless aware, is: gasoline is a volatile liquid, while kerosene is an oil, with a certain quantity of volatile matter in combination. With gasoline, all that is necessary to enable one to burn it in the cylinder of a motor car engine is, that the pressure upon the surface of the body of gasoline from which the supply is taken shall be reduced. It evaporates immediately the tension of the vapor in the air in contact with its surface is lowered; and this is done at every suction stroke of the piston.

With kerosene, lowering the pressure upon its surface causes a certain portion of its volatile constituents to evaporate, but the body of the fuel passing into the engine remains in the liquid form, and the larger portion of it would either pass out through the exhaust, or pass the piston rings into the crank chamber.

In order that it may be used as a fuel, heat must be applied, and the oil converted into vapor and maintained in that condition until it reaches the cylinder.

It is interesting to note that, since the specific gravity of gasoline has increased so much over the original figure, from 0.67 to 0.72, the makers of gasoline carburetors have added heating apparatus to the float chambers; the heat is usually taken in these cases from the hot water coming from the radiator.

For kerosene, however, the heat is nearly always taken entirely from the exhaust gases; in a few cases the hot water from the radiator is used on the float chamber, and the hot gases later on. One thing appears to be absolutely necessary; the kerosene must be converted into vapor, the whole of it, and for that purpose plenty of heat must be applied right up to the inlet valve.

The arrangements for using kerosene are very similar; in nearly all cases a vaporizer is added, the kerosene being passed through the gasoline carburetor, sometimes before it enters the vaporizer, and sometimes after; in a few cases the gasoline carburetor is only employed when gasoline is used during the period of starting.

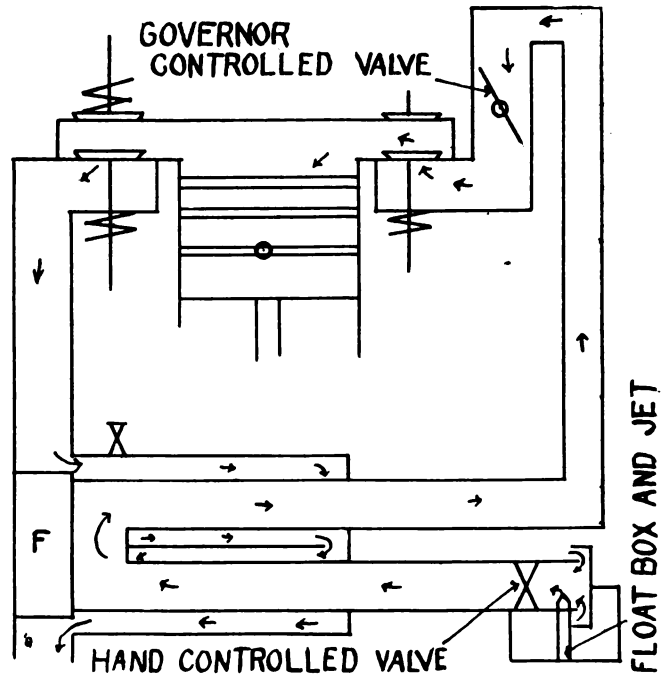


Fig. 1.—Diagrammatic Sketch of Thornycroft's Kerosene Vaporizer.

Fig. 1 is a diagrammatic sketch of the Thornycroft kerosene vaporizer, which has been applied to all kinds of store vans; tradesmen's vans, as they are called on this side; also to lorries up to five tons load. It is a

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very fair example of the method employed, where the carburetor assists.

As will be seen from the drawing, the kerosene is first passed through the carburetor, and then through

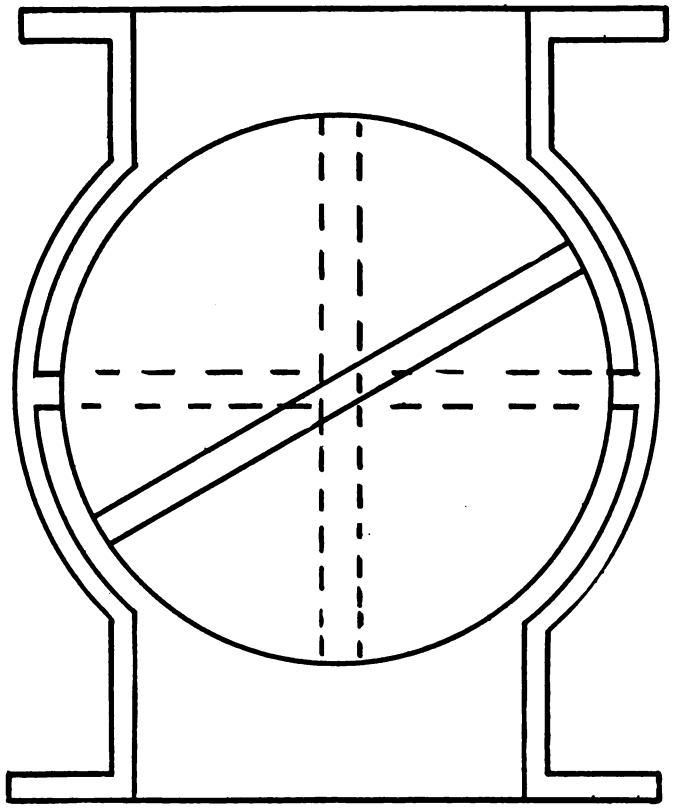


Fig. 2.—Section of Valve by Which More or Less of the Exhaust Gases Are Allowed to Flow Through the Vaporizer.

the vaporizer, the latter consisting of a system of concentric cylinders; the hot gases flow through the outer and inner cylinders, the kerosene through the middle cylinder, so that it is exposed to heat on both surfaces.

It will be remembered that the thermal conductivity of both liquids and gases is very low, and if a core of either is left, not exposed to heat, there is a possibility of a portion of the kerosene not being vaporized; the arrangement of the Thornycroft vaporizer overcomes this.

As will be seen from the drawing, the hot gases are led into the vaporizer, from the exhaust pipe, as close to the exhaust port as possible; and the quantity which flows through the vaporizer is controlled by the valve shown in section in Fig. 2. In the drawing, Fig. 2, the valve is shown at an angle of 45°, in which position part of the exhaust gases go through the vaporizer, the remainder flowing directly to the exhaust; if the valve is placed horizontally the whole of the gases pass through the vaporizer, and if vertically none pass through it, the whole passing to the exhaust.

The position of the valve can only be obtained by actual trial under each conditon. In the United Kingdom the whole of the gases are sent into the vaporizer when it is first put into operation, and gradually worked back until the best running position is obtained. If the vaporizer is too hot, the power of the engine is lessened, and if it is too cold, some of the kerosene passes through unvaporized. It is recommended not to allow the vaporizer to cool when stopping is frequent. Under ordinary running conditions, if this point is attended to, a stop of half an hour, which would usually be quite sufficient under all conditions, will not prevent restarting.

Another representative apparatus is the Smith-King kerosene carburetor, which is shown in section in Fig. 3, and to its action diagrammatically in Fig. 4. As will be seen, there are two float chambers, one for kerosene and the other for gasoline. As with other forms of apparatus, the engine is intended to be started on gasoline, a small quantity of which is carried on the car in a separate tank.

This form of carburetor has four jets, which deliver into the induction pipe, the pipe leading to the engine cylinder, through four different ports in a sleeve which slides over the jets, and uncovers the ports as it moves upwards or downwards. When the engine is at rest only the gasoline port is open, and as the engine warms up and attains speed, one port after another is opened, the kerosene coming into operation as the different ports open and the gasoline port being closed when the last kerosene port is opened.

The action is perfectly automatic; if the speed of

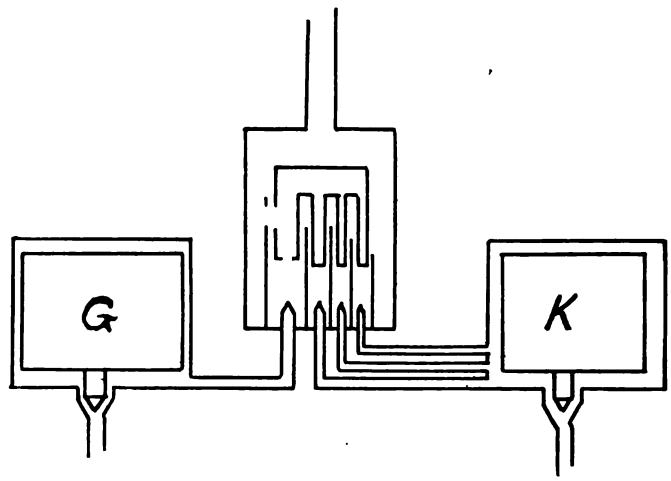


Fig. 3.—Sectional Drawing of Smith King Carburetor for Gasoline and Kerosene. G, Is the Float Chamber for Gasoline Fitted with One Jet Only; K is the Kerosene Float Chamber with Three Jets.

the engine falls below a certain figure, as when a car is held up by a block in the traffic, the gasoline comes into operation to provide for the acceleration when the block is opened, and it is shut off again when the car gets up speed.

In this apparatus the kerosene float chamber is heated by the hot water from the radiator; but in addition a "muff" is provided, as shown in Fig. 4, enclosing the pipe leading from the carburetor to the engine, and exhaust gases are made to flow through this muff, the object being, as explained above, to keep the kerosene in a state of vapor; if this is not done, if the vaporized kerosene is exposed to the atmospheric temperature,

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there is a considerable danger of a portion of it at least being condensed, and passing through the cylinder unconsumed.

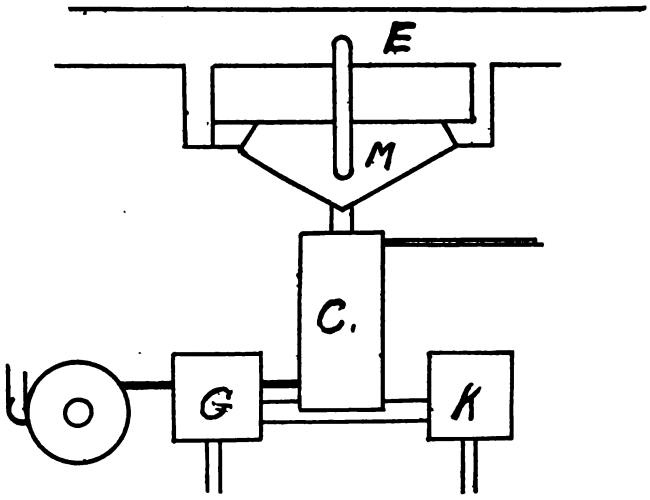


Fig. 4.—Diagrammatic Sketch of Smith-King Carburetor for Kerosene and Gasoline. G and K Are the Float Chambers; C the Jet Chamber; M the Muff Connected with the Exhaust Manifold; E, Intake Manifold.

There are several methods of using the exhaust gases to heat the kerosene, and to maintain it in the condition of vapor, but they are variations of the above.

The Question of Starting.

One of the greatest difficulties has been starting with the engine cold, and the kerosene cold. With several forms of apparatus the arrangement employed in the Smith-King is used in various ways: gasoline being employed when starting, and the supply shut off immediately the engine is warm and there is a sufficient supply of heat from the exhaust gases to vaporize the kerosene.

A method in which an electric heater is used as an auxiliary will probably be interesting; it is shown in Fig. 5. The kerosene is made to pass through a heating pot, in which there is an electric heating element as shown in the figure. When the engine is to be started the electric element is heated from the starting, or lighting battery, and the vaporization is stated to be sufficient in from two to three minutes for the engine to start on the kerosene vapor alone.

With this apparatus a muff is also provided around the pipe which carries the vaporized kerosene into the cylinder; and in addition, in place of heating the bulk of the kerosene by a jacket of hot gases, it is heated by the addition of a small quantity of the exhaust gases themselves, between the throttle and the inlet valve.

In another method of starting and of vaporizing the kerosene which is interesting, solid fuel, charcoal anthracite or coke is employed; the fuel is held in a circular vessel fixed above the engine, and spiral ducts are cut on the inside of the fuel chamber, through which the kerosene is made to pass on its way to the induction pipe of the engine.

Vertical grooves are cut in the side of the vessel also, cutting the spiral groove and providing an easier path for the lighter hydrocarbons that are evolved first from the kerosene. The idea is, there is a considerable difference in the time required for the lighter and the heavier hydrocarbons to gas away; the lighter ones flow down the vertical grooves, and the heavier ones follow the spiral grooves, all of them being in the end completely vaporized. The solid fuel is lighted at the bottom before the engine is started up, and it is only when a certain amount of heat has been liberated in the fuel chamber that the kerosene is allowed to flow from the carburetor into the spiral groove.

Where gasoline is not available, the Thornycroft apparatus, and some others, can be started, as many stationary oil engines still are, by heating the vaporizer with a blow lamp.

Efficiency of Kerosene Driving.

The efficiency of motor car engines designed to work with gasoline is less with kerosene, partly due to the lower calorific value obtainable from the kerosene, partly to the fact that kerosene works best with a lower compression than gasoline, and partly from the fact that unless the pistons are fitted with special rings, and great care is taken that none of the kerosene is condensed

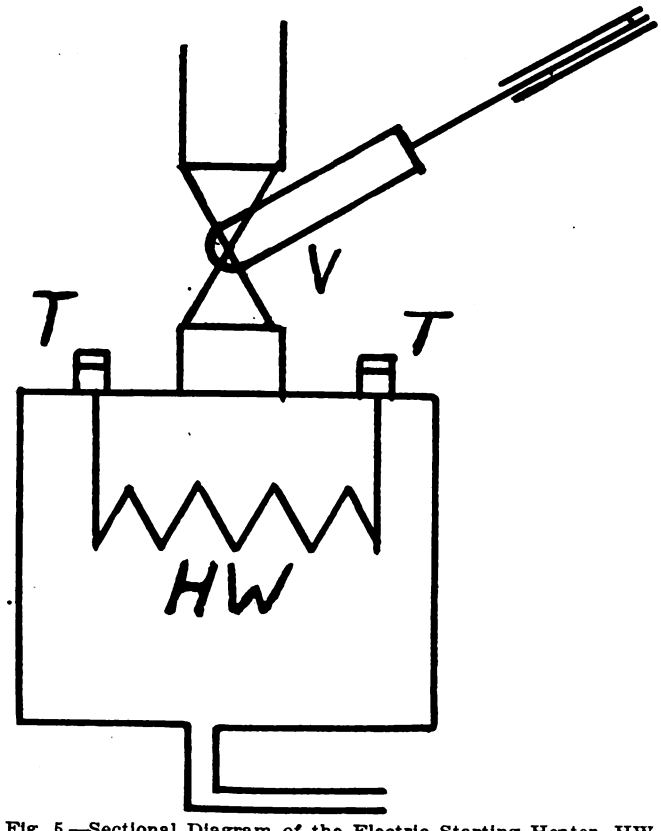


Fig. 5.—Sectional Diagram of the Electric Starting Heater. HW, Heating Wire; TT, Terminals for Switch and Battery Connections; V, Butterfly Valve.

when it enters the cylinder, there is considerable danger of a portion of it working past the piston rings and mixing with the lubricating oil in the crank case.

Makers who have specialized with kerosene recommend that the oil shall be removed from the crank case more frequently when kerosene is used than with gasoline, so that this difficulty can be obviated.

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Automobile Dealer and Repairer

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MAY THE WORLD BE ILLUMINED BY THE LIGHT OF LIBERTY

How to Read and Profit by the Articles in Our Magazine

RATHER a peculiar title to this editorial, isn't it? But it isn't half as queer when you think about it. We find that many readers do not always know just how to read our magazine; for instance:

Not long ago a subscriber wrote us the customary letter of satisfaction saying that all of the articles were interesting, but that he liked a certain type of article better than others, some of them he seldom had time to read.

That subscriber did not get the full value for his money—we gave him full value—but he did not take advantage of his chance; he didn't read every page as he should.

Don't pass over an article because the title does not interest you. The story itself may contain suggestions that are of the utmost value to you. If you are a car owner, read the garage stories, they give "inside dope" on garage practice. They tell how certain work is being done, or how it may be done in the cheapest manner, and if you are familiar with general practice you will not permit the garageman to overcharge you.

If you are a car owner or a mechanic, you may say that the advertising articles do not interest you. BUT THEY SHOULD. Self-advertising is the most valuable and greatest art in the world. A self-advertised man is always successful; provided he knows HOW to advertise himself. Read the advertising articles, they tell you how.

We make one big claim for our magazine. It is 100 per cent efficient, it has no useless word fillers, nor ornate pictures. It may not appeal to an artist or a person who cares only for pretty pictures—but it DOES appeal to the man who wants mechanical information that he cannnot obtain from books. This magazine is "all wool and a yard wide."

Concerning the "Post Mortem" of the "Sick Car Series" in October Number

THE Undertaker and the Graveyard" is the leading article for our October number. We choose to consider it as a "Post Mortem" or Obituary of the Sick Car series, the last of which appears in this issue of the magazine.

Doubtless all our readers have enjoyed these articles as well as profited by them. They are written for the purpose, primarily, of instruction, and secondarily, to make them as interesting as possible without detracting from their value.

The Undertaker and the Graveyard is the same type of story and is very appropriate at this time when it devolves upon all of us to conserve as much as possible.

We don't want you to make a mistake when you read the title of the article—don't think that it deals with automobiles whose days of usefulness are over—for it doesn't; it tells you how to resurrect a "dead one," or one that is almost ready for the junk pile.

Sell Trucks and Tractors, Is One Solution of the Dealer's Problem

THE general consensus of opinion would indicate that the passenger car production in 1919 will be cut down to a negligible figure. If the manufacturers cannot obtain the necessary steel, then the industry will suffer and the question at once arises, what will the passenger car dealers do to maintain business?

There has been too much specialization in the industry; a man who sold cars did nothing else, he knew how to dispose of new cars, but he did not care about mechanics, since that branch of the business did not enter into the transaction to any extent.

Obviously, there will be many dealers who will be obliged to close shop if the 100 per cent curtailment goes into effect; but there will be many who keep up their salesrooms. The far-sighted dealers will have prepared for the storm, to use a figurative expression, trimmed their sails and have gone on another tack.

At the present time there is an enormous demand for

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both trucks and tractors. As evidence of what may be done by means of trucks, consider the city of New York. Practically all of the produce, wearing apparel, building material and other necessities of life, used in Greater New York is trucked from factory to terminal or distributing points. Foodstuffs are trucked from terminals to consumer and distributer, and though horses are used in great numbers, motor trucks are increasing in number.

Without motor trucks, the transportation facilities of New York would be entirely inadequate and the merchants and business men are beginning to realize that a truck replaces horses, teams and men; saves time and money; and makes quicker deliveries possible.

Within two years motor trucks have graduated from the "possibilities" class into the "probabilities" class; within another year the truck will have advanced into the class of "necessities."

So it is with the tractor. The farmer, who heretofore has not realized the possibilities in extensive cultivation of land has been confronted with a serious problem, that of cultivating what land he owns without sufficient labor. A tractor is itself the solution of the problem, and in addition it makes possible the breaking of more soil than ever before, despite the dearth of help.

The farmer is just beginning to realize that his income may be doubled, or trebled providing he can afford the necessary farm machinery. He can be made to see the value of a tractor as an all around utility machine.

It follows, therefore, that many of the present automobile salesmen will find ready employment by the sale of trucks and tractors. As many more will turn toward the repair field. There is no reason why both branches cannot be taken up and the dealer's organization kept intact until the war is over and the production of passenger cars again commences.

Only the Yellow Dogs Drove Their Cars for Pleasure on Sunday

ON August 29th the Fuel Administration requested that automobilists should not operate their machines for pleasure purposes for the next four to six Sundays. The reason for this request was to prevent a serious shortage of gasoline. It was a patriotic measure and met with a fine response throughout the country.

Statistics indicate that only about 15 per cent of the automobile owners ignored the request and continued to operate their cars as usual. Fifteen per cent of the people decided that their own personal pleasures should be placed before the welfare of the country.

We have in mind the census taken around Boston which seemed to indicate that a large percentage of those who operated machines were of the wealthy class, that is, only a very few Fords were in operation on the first Sunday on which the request went into effect.

Perhaps those people feel that they have done their duty in purchasing Liberty Bonds. What a fine patriotic spirit those people show! They were willing to lend Uncle Sam their money providing Uncle Sam paid them more than they could obtain from the banks. How about the poor people who not only loaned their money but made tremendous sacrifices as well?

We hope that the police will see fit to publish the names of all those egotistical and selfish car owners. We hope that the finger of scorn will be pointed at all of those german sympathizers, for are they not helping along the cause of germany?

We trust that all of our readers will do their best to discourage Sunday riding as long as the Government requests.

Prevent these yellow dogs from driving their machines upon the streets if possible, and if this cannot be done make their Sunday pleasure trip a nightmare by telling them what you think about them.

Possibly they can afford to buy gasoline, but does their money pay for the lives of the boys we are sacrificing on the other side? Ask them what they are doing to win the war. You know that they are trying to lose it, if you see them riding in a machine. They are stealing the fuel which belongs to our fighting forces. You are paying for it, not they.

It is people such as they that are prolonging the war and crippling our fighting forces. If everybody ignores the Fuel Administration's request, the war will be prolonged and these people that own automobiles will be taxed more heavily to meet the demands. Fuel for Sunday pleasure riding cannot be paid for in money.

Back up the boys at the front by sacrifice rather than by mere empty words. Don't expect someone to do your fighting for you unless you can do your part in helping fight.

If you cannot put on a uniform and go over the water don't be a cur and steal the necessities from those who are men enough and women enough to sacrifice their lives and their business by going across. Do your part and see that your neighbor does his part too.

If he is not willing to, find some way of making him. This is your fight just as much as anyone's else. Remember that we have a big fight on our hands in America as well as in germany. Don't be a shirker. Do your part and then do some more.

Let Your Deeds As Well As Your Words Prove Your Patriotism

LAST Wednesday afternoon a large seven-passenger touring car was stopped on Brooklyn Bridge by a khaki-clad young man who seemed to be in a hurry to get across the bridge. The writer heard the young fellow ask the driver to take him across but the driver refused to do this.

The driver was a young fellow who appeared to be about twenty-eight years of age and was undoubtedly

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within the draft limit. That man was not only a slacker, but a selfish, unpatriotic person who did not deserve the title of an American. He is the sort of man that should be drafted into the service under any condition. He should be made to fight, for it is the only way that patriotism can be brought into his sluggish brain.

Anyone who is not willing to stand behind the boys who are risking their lives for the country ought to be branded by their fellow citizens as cowards.

Suppose that all of us make a vow to ourselves that we will do our part and be kind to those fellows who are doing our fighting for us. Next time we go out in our machine, let us look around and try to find some soldier boy who won't have a chance to ride in an automobile for some time, and let us give him a "lift." We may be slackers because we have to, but let us do all we can to soften our title. Let us put a sign upon our windshield, "Boys in uniform hop in. The pleasure is ours. You are welcome."

What Makes the Difference Between Successful and Unsuccessful Men?

IS it not largely that the one does things, and the other thinks about them, but does not do them?

Now, it does not matter how many excellent plans, in a business way, may occur to you. Unless you put those plans into execution in some shape or other, they will never be of any value to you. They are like a seed that has never been planted.

It is related of General Grant that when the Chattanooga campaign was at a standstill, and nobody seemed to know what to do, he went down there to find out what the trouble was. He asked the general in command, whose name the writer does not at the moment recall, but who was probably Rosecrans, what he had contemplated doing. The general showed Grant a plan that he had formulated, and Grant read it over carefully. Then he said: "Your plan is well enough; why didn't you execute it?"

The result of Grant's trip was that he issued some orders immediately, which were promptly executed, and the whole difficulty was cleared up.

Some people are credited with what is called "executive ability." These two words look rather formidable; but what is executive ability, anyhow, except the capacity for doing something—doing it promptly, or arranging to have somebody else do it; it does not matter which? The man who wins great success can't do it entirely by his own personal exertions. He has got to employ others, and must see that those others execute his plans. It is in seeing that plans are executed that "executive ability," so called, comes to the front. But these rather high-sounding words can be summed up in two plain Anglo-Saxon words. "Doing Things." The man who does things has executive ability, whether he does them in a small way or a big way, or whether the things he does turn out well or not.

Some people think of a plan, and keep thinking of it, week after week, and perhaps tell all their friends about it, but do nothing. The plan may be good or bad; you can't tell until you try it. Most of those who succeed try a whole lot of ways of doing things, and many of those ways turn out badly, but some of them are good. The only thing to do is to keep right at it. When one plan doesn't succeed, try another, until you hit upon one that is successful. There is nearly always a way, if you can find it.

Executive ability will not alone make a man successful. He must understand his business so well that offhand he can decide any and every question that each day is quite sure to present itself for consideration and solution. He may not always decide right; nobody does. But it is better to decide, even if one is wrong, than to waste time weighing pros and cons. Wrong decisions are not apt to be made twice, with respect to the same question. It is by practice of this sort that we learn to reduce the percentage of incorrect decisions.

To lift yourself above the average and stay there, you must know a little better how to do things than the average man does, and the acquisition of this kind of knowledge takes time. Any man pursuing some avocation steadily, is likely to find himself past forty before he can see over the heads of the competitors in his line. When this happy time arrives, he may consider himself on the high road to a successful career.

Loan the Government Your Money and Help Lick the Beast of Berlin.

THE time has come again when we must all dig down into our pockets for more money to win the war. Wo do this with a glad heart because in the first place we know that our cause is just. We know that every dollar we loan the Government means another nail in the kaiser's coffin. We know also that we are only loaning it, and we are loaning it at a rate of interest in excess of that which we are able to obtain at the banks.

The government, however, must have the money or our boys will have been sacrificed in vain. Everyone should do their own part not only by loaning money but by influencing others to loan money. Employers should organize "Win the War meetings" and do their part in influencing their employees to subscribe. It is to their advantage that the money be furnished. It is not only to their advantage but to the advantage of every citizen in the United States. If we do not whip the germans in Europe, we will be obliged to fight them on our own soil sooner or later. Let us do a good job while we are about it NOW!

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This department is maintained for the protection of our readers—especially our reckless readers, if we have any.

The object is to encourage every operator of a motor vehicle to be careful and avoid accidents, especially the inexcusabe accident of a collision at a railway crossing.

THE past two numbers of this magazine did not contain our Life-Saving Department page, for the reason that we had so many mechanical articles of interest that we did not have room for it. It is not our intention, however, to discontinue this valuable department.

We feel that the autoists throughout the country should be warned repeatedly against accidents. We do not feel, nor do we wish to infer that any of our readers are careless. At the same time, however, it is not always the careless person who suffers in an accident.

The victim may be entirely innocent of wrongdoing, yet suffer because someone else has broken a law or overspeeded. Carelessness is, and always has been, the direct cause of 90% of the accidents occurring. A small percentage have been due to intoxication, while an extremely small percentage have been due to faults in the car itself. The manufacturers deserve commendation upon this fact and we doubt that there would have been any accidents due to the failure of car mechanism had not the car been strained through careless driving or excessive speeding.

A Peculiar Accident: An extremely peculiar accident occurred near Philadelphia early this month when a girl was badly injured through falling from a rapidly driven automobile. It seems that the car was crowded and the girl was leaning against the tonneau door which was not fully latched. The door swung open and the girl was precipitated into the street.

Driving While Intoxicated: Early last week an intoxicated driver in Salt Lake City drove his machine past another which was being operated at a fair rate of speed, driving directly into a young lad who was standing within a safety zone at the intersection of two streets and killing him instantly.

Out Joy Riding: Seven men riding in an automobile along the lake shore road at Buffalo were injured when the machine in which they were riding collided with an auto truck upon the road. The auto truck was being driven at a normal rate of speed and the automobile did not give the truck sufficient road in which to pass.

Reckless Driving: An eighteen year old boy of Philadephia is being held by the Deputy United States Marshal for trial before the Federal Court. The young man, who was at the time of the accident in charge of a mail truck, was carrying three young women, as passengers. Witnesses say that his car was being driven at a high rate of speed and failed to negotiate a turn. It rolled over twice and pinned the girls beneath it. Two of the young ladies are at the hospital seriously injured.

Jealousy in Speeding: Just because a Ford car driver tried to get ahead of a large Hudson car at a dangerous curve, in Providence, an aged man is now suffering serious injuries at the hospital. The driver of the Ford car was operating his machine at about fifteen miles an hour across an intersecting street which was hidden by billboards at each side. He was recklessly speeding simply because he was trying to outdistance a larger car.

Excessive Speeding: Because a driver of Esterville chose to ignore one of nature's laws that a turn cannot be negotiated at an excessive speed, he is at present held in jail awaiting trial for the murder of two persons. He claims that he did not know the road and tried to make a sharp turn at a speed of approximately 45 miles an hour. The car overturned and pinned two of the occupants beneath it, killing them probably instantly. The third passenger escaped with a few minor cuts.

Makes Wrong Turn: While driving his automobile along Clinton Avenue, Newark, New Jersey, a young man carelessly turned his machine to the left rather than to the right when meeting a trolley car. The wheels caught in the track and the machine was practically demolished by the car. The driver was badly injured and taken to the city hospital.

Injuries Inflicted Wholesale: A short time ago a motor truck operated at a high rate of speed down a hill in the Bronx, New York, leaped the curb and ran into a crowd of children playing upon the sidewalk. A number of the children were badly injured and carried to the hospital. Witnesses say that at the time of the accident, the chauffeur was not intent upon his job, but was lighting a cigarette and had but one hand on the wheel.

Boy Crushed by Automobile: The lights of an automobile operated in Richmond, Virginia, were not working properly and the chauffeur drove the machine into an alleyway with which he was unfamiliar. The machine hit a small boy who was playing and pinned him beneath the bumper and the wall at the end of the alley. He is at present in the hospital and but little hope is held out for his recovery.

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Nonsense, and Some Sense

Facts That Are Sprinkled With Jest Often Stick Longer in the Mind Than Rows of Plain Figures

You can fool a horse, sometimes, by feeding him sawdust, but you can't make your engine run on water. Make a point of draining the carburetor once a month; a drop of water in the carburetor does as much damage as a quart in the cylinders.

* * *

You may like to work on your machine, but don't spend two hours trying to find a cotter-pin hole, mark it on the end of the bolt with a punch or chisel.

* * *

Don't try to use kerosene oil as a lubricant; it won't work. Drain the oil from the crankcase every month and replace it with new.

* * *

Dirty hands are not always a sign of honest toil. Rub soap lather into the pores of the skin before working on your machine, the dirt will come out with the lather. Soft soap under the fingernails obviates that "line of crepe."

* * *

A nut tightened in time saves buying a new engine. Loose nuts and bolts are like germans: they raise "the Dickens" generally.

* * *

Smooth runs the auto when the springs are greased.

* * *

A hole in a tire is like a hole in the pocket where you keep your money; mend it.

* * *

Noise is not always an indication of power; remember this when you open your muffler cut-out. It may sound good to you, but your neighbors may think you are nothing but a little boy with a new toy.

* * *

Kerosene oil is a mighty good liquid for removing grease and dirt from a machine, but remember that it will also remove paint and finish as well—perhaps that's why the finish on your car doesn't look like new.

* * *

A stiff steering gear will keep your car running in a straight line; but not all roads are straight, some of them have turns.

* * *

A hammer and a cold chisel together can be used in place of a wrench, but it is always best to use this substitution on someone else's car.

* * *

If you want an excuse for buying a new car and discarding the old, wait until November before you put the anti-freezing solution in the radiator.

The man who races his engine and the "fool who rocks the boat" should be put under the same classification.

* * *

If a man tells you that he can get twice as much mileage from a gallon of gasoline as you, don't call him a liar, see how he does it, he may be telling the truth.

* * *

I saw an engine, not long ago, that had been run for ten minutes without either water or oil—it was in a junk yard.

* * *

Any fool can run an automobile at sixty miles an hour over a steep embankment, but it takes a strong and rugged man to survive the experiment.

* * *

An oil-soaked rag and a garage fire often go together; if your car is not insured, don't keep oily rags in the tool box.

* * *

If you want to be kept in blissful ignorance about the "insides" of your automobile, don't read the Automobile Dealer & Repairer, it gives too many mechanical suggestions—read a cook-book.

* * *

When your engine knocks, it means that it wants to get in—to a repair shop.

* * *

Sand is a good thing to have in business, but a mighty poor thing for an automobile clutch.

* * *

One can usually stop a car, moving at 25 miles an hour, by applying the brakes, but it often takes an express train or a stone wall to stop a machine traveling at 60 miles. Which method do you prefer?

* * *

It is a fact that if every automobile driver in the country obeyed the law, we would need only one-tenth as many traffic officers.

* * *

No, your liberty bond is not a license to drive your car on a gasoline-less Sunday.

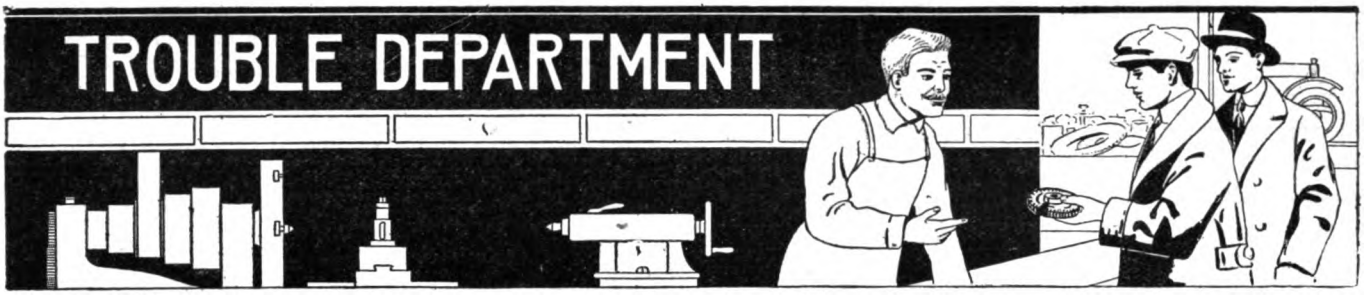
* * *

If you want to commit suicide, go into your garage, close all of the doors and windows and start the engine. Even a pulmotor cannot frustrate your plans.

* * *

A piece of crude or sponge rubber will usually put a quietus on a weeping radiator, stuff it around the leak and press it down with a cotter pin puller or an ice pick; rubber cement can often be used for the same purpose.

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Use Cotter Pins.

2491

From John Kelly, New Jersey.—In taking up bearings, both main and connecting rod, a cotter pin is used to secure the nut on bolt. Would not a heavy lock washer do as well?

Reply.—A lock washer may answer the purpose all right but there is always the question of its effectiveness. You might tighten up the nut upon the washer enough to hold the nut in place, but sooner or later the spring tension on the washer might decrease enough to allow the nut to unscrew because of the vibration. We would not advise you to use a lock washer upon any moving part of the automobile for by doing so you might take a chance and damage the machine very greatly.

Cylinder Scoring.

2492

From Fred Kegel, Ohio.—Will you kindly tell me the common causes for cylinder scoring? How can cylinder scoring be prevented? If one cylinder lacks compression will the engine be apt to run unevenly?

If kerosene or alcohol is poured into the cylinders while the engine is hot to remove carbon, will the cylinders be scored? What causes the brake drum on a Ford car to groove? How can it be prevented?

Reply.—There are a great number of causes for cylinder scoring and occur in about the following order: Lack of lubrication, broken piston rings, dirt or carbon in the lubrication, overheating through lack of water, or any other cause, loose wrist pin or excess carbon.

If one cylinder is scored and the compression is much lower than that of the other cylinders, the engine will run unevenly and will not develop its full amount of power. If alcohol or kerosene is poured into spark plug holes while the engine is hot in order to dissolve the carbon, the cylinders will not be scored if you are careful to crank the engine four or five times before starting it.

The reason for the scoring of the Ford brake drum is lack of lubrication, but if you lubricate this part you will destroy the braking properties. There is no remedy for this with the regular equipment. The only thing you can do is to purchase a new expanding brake which is covered with a fabric facing. These you can obtain at practically any automobile supply house.

Relative to the scoring of cylinders, if you have an engine in which one cylinder is scored, or even all are scored only slightly, you might try the following remedy, which often restores the compression for many days or weeks. Start the engine up and run it at a normal speed. Then pour into the carburetor intake about a teaspoonful of Dixon's Flake Graphite. This product has a tendency to fill up the small scores in the cylinder walls and so restore the compression. You may be obliged to clean the spark plugs frequently, the first day after applying graphite. After that, however, the graphite will fill in the scores and your engine will run normal.

Locomobile Wiring.

2493

From R. J. Martin, Massachusetts.—I have a Locomobile, 1915 model, fitted with a Westinghouse system. There is a live wire which leads from the generator to the switch and also connects through the voltmeter to the ground. Why doesn't this live wire exhaust the battery?

Reply.—There should be no live wire between the dynamo and the volt meter to the ground, except when the engine is being run. As soon as the engine is stopped the volt meter should register zero, providing there are no lights being used. The current from the battery passes from the battery through a magnetic cutout to the starting motor, through the starting motor to the ground while the engine is being started.

Current for ignition system passes from the battery through the ignition switch and fuse blocks to the ignition coil. As soon as the engine starts the dynamo begins to operate, generates current which passes from the dynamo through the volt meter to the ground, back to the battery, through the battery and switches back to the dynamo again, through the magnetic cut-out which prevents battery discharge or dynamo charge as long as the dynamo is operating at low speeds. As soon as the dynamo speeds up, however, the magnetic cut-out closes and permits the current to charge through the battery. The wire passing from the volt meter should not be live until the dynamo is generating enough current to charge the battery.

If your volt meter registers when the dynamo is stopped, it is an indication of a short-circuit at some point, or an indication that the magnetic cut-out is not working properly. In this case, it would be necessary for you to have the system looked over by some expert repair man.

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Chevrolet Head-Light Trouble.

2494

From Earl R. Smith, Kansas.—I have a Chevrolet car, 1918 model, and am having trouble with the lights. The lights are all right until the switch is turned to the dim position, then the left headlight goes out and the right light stays as bright as ever. Can you help me with a suggestion.

Reply.—We are sorry that you did not tell us which model machine was used. The two models are wired differently so that we are unable to furnish you with a diagram unless you give us more details. Doubtless, however, you can locate the trouble easily enough by following the directions given below. If you are unable to do this, let us know immediately the model of your car, the model of the generator, the model of the motor and the model of the starting switch. Be sure to send us a sketch of the present wiring of the light switch as there were a number of these switches used.

With both lights going at their full candle power, the current should pass from the battery to the switch, a portion of it from the switch to each headlight. With this switch position the current passes back from the left headlight through the switch to the ground, while the right headlight is grounded directly to the frame. With the switch at the dim position, current should pass from the battery through the switch to the left headlamp, back from the left headlamp to the switch, thence to the right headlamp, then to the ground.

In other words, in the first case the headlamps are wired in parallel with the battery, whereas in the second case they are wired in series, the switch making the necessary connections. There are a number of possibilities for trouble.

In the first place, remove the left headlight connecting block and turn it one-half a revolution, then put it back again. If this does not remedy your trouble, examine the wire which leads from the switch to the ground or be sure that the switch is grounded perfectly. Next examine the inside of the switch and see that all of the wires are connected and that there is no foreign matter or oil which may short-circuit the inside of the switch to the dim position, then remove the covers and see if the lights function properly. If you are still unable to find the trouble, do as we suggest above and we will let you know immediately.

An Evasive Knock.

2495

From J. A. Moray, Michigan.—I would like a little information about my Ford car. The machine is a 1910 model, rebuilt and largely brought up to date. The cylinder block is about three years old. For a number of years there has been an evasive knock which occurs occasionally. The machine will run miles without a knock, then the knock will occur and go away again shortly.

The knock sounds like the striking of a tack hammer against a heavy piece of iron. Do you think it can be piston slap? I tried to install oversize pistons .0025 larger, but they were too large. Do you think that a standard piston would slap in a cylinder .002 oversize?

Reply.—We doubt very much if the knock is caused by a piston slap. A piston of standard size would not slap in the cylinder .002 oversize, provided the rings are a tight fit in the cylinders. We would advise you to examine the wrist pins, as this is probably where your trouble lies.

After the pistons have been removed from the cylinder make a careful examination of the walls and be sure that there are no grooves or ridges in them. It would be well for you to measure the diameter of the cylinders at a number of points. Be sure that they are not worn "egg-shaped." There is a vague possibility that your trouble is due to excessive compression. The installation of a new cylinder head would remove this trouble.

Removing Radiator Compound.

2496

From Chas. H. Barr, Michigan.—Will you kindly tell me how to remove radiator compound from a Chevrolet radiator? I just purchased a second-hand car and the former owner filled the radiator with sealing compound so that it will not work well; I guess he used too much. I have tried potash lye and water and would like to know if this will damage the radiator.

Reply.—We usually recommend a mixture of potash lye and water for cleaning radiators. One can should be sufficient if mixed with enough water to fill a radiator. Before putting this mixture in the radiator, strain it through a cheesecloth to remove all dirt. Be sure to flush the radiator well after using, for although the potash lye may be harmless, in many cases there is a faint possibility that it will destroy the rubber tubing if left in the radiator.

It is an easy matter to flush the radiator if you start the engine and turn the hose directly into the filler pipe, leaving the drain plug open. Let the engine run about five minutes. If the potash lye does not give satisfaction, mix up one-half pound of washing soda with sufficient water to fill the radiator. Fill the radiator with this solution, after it is strained, and run the engine about ten minutes, so as to circulate it through the whole system, then drain it out and flush the radiator as directed above.

Compression Too High.

2497

From R. C. King, Pennsylvania.—Recently I had new rings fitted in my Chalmers model 35-A car and ever since, when the engine attains a speed of about 25 miles per hour, or when coasting at that speed, there is a knock. What do you think the trouble may be?

Reply.—We assume that the trouble with your Chal-

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mers car is due to excessive compression. Present-day fuels are much heavier than they were a year ago, and to utilize these heavier fuels an engine should not have such high compression as formerly.

Your engine probably had very high compression, and as time went on wear gradually caused leaks in the cylinders past the rings, thus resulting in lower compression. However, as soon as you fitted new rings to the cylinders you restored the compression to its original pressure and naturally a knock resulted. The remedy for such a knock is the removal of some of the iron at the top of the pistons or in the explosion chamber, or it may be possible to obtain the thicker gasket, which will lift the head slightly. If you can have about 1/16 of an inch of metal burned off the top of each piston, your trouble should be remedied.

However, before doing this it will be best for you to have the compression tested by means of a special instrument called a compressometer, which is arranged somewhat like a steam gauge. The Chalmers people should be able to tell you just what compression is best in that engine.

There is another possibility, and that is a loose flywheel or loose clutch member. In this case the knock would occur when the car is traveling faster than the engine,—in coasting down a hill, for instance. Try to locate the knock. You can do this by means of a stick of wood placed between your teeth, or by means of an old telephone receiver fitted with a stick at the end of it. It is very possible that the knock may be in the transmission system rather than the engine, and if so, look for loose gears or loose clutch members.

Starting Motor Trouble.

2498

From Andrew Burns, New York.—I would like to know what causes trouble in my starting motor on a National car. A number of times the motor has locked in place and when the button was pressed nothing happened. I have managed to release the motor after working the car back and forth. The starter is a Westinghouse.

Reply.—Your trouble may be due to either or both of two things. After tagging the wires remove the motor from the engine. This you can do very easily by removing the motor support and the screws in the flywheel housing. Examine the bendix drive pinion gear and see that it works smoothly upon the worm. Clean it very carefully, then examine the reduction gearing in the motor itself.

It is very possible that some of the gear teeth are broken or that some foreign substance has found its way into the gear box. If the teeth on all gears are in good condition, clean out all of the old grease very carefully and put in new. This will probably eliminate your trouble.

Differential Trouble.

2499

From F. C. Barrios, Louisiana.—We are having trouble with the transmission of a Chandler car. At high speeds there seems to be a loud hum, which ceases when the engine labors. We have recently changed the main roller bearings, but this repair does not make any difference. Do you think the machine has been strained?

Reply.—Your trouble is probably due to the fact that the differential gears, *i. e.*, the pinion and master gears, have been worn badly, resulting in a certain amount of clearance at the teeth, or the removal of the working surface of the gears.

It is possible that you may be able to adjust the gears, but we doubt it.

First adjust the pinion and the master gear so that their backs come together. Screw both adjustments up as tightly as possible, or until the teeth "bottom." Then back the pinion gear away from the master gear 1/64 inch, also back the master gear from the pinion gear an equal distance. Fit some sort of wood handle to the driving shaft or the pinion gear, turning the assembly rapidly by hand. A grinding noise indicates too close an adjustment.

In this case the pinion gear should be backed away from the master gear a small distance, and the master gear also backed away. If there is any other kind in back lash or play in the second gears, adjust them closer together; be careful, however, not to adjust them so closely that the teeth bottom against each other. If there is less motion or play in any case, and this play cannot be compensated, you will be obliged to purchase a pair of new gears. In making any and all adjustments, the pinion gear and the master gear should be moved an equal distance away from each other always and start with the backs of the gears in line.

Rounding Push Rods.

2500

From Rudolph Ahrens, New York.—Mr. H. Cleveland of Kansas, in your February issue, states that noisy tappets can be prevented by rounding off the end of the push rods, but he fails to say which end to round off. Would the valve timing be changed if the head were rounded off?

Reply.—The push rod should be rounded off at the lower end, where it rests upon the cam shaft. It should be rounded in all directions— that is to say, the head should resemble a ball upon the surface; for you must realize that an ordinary mushroom tappet rotates in its place. The valve timing would not be changed.

Leak-Proof Piston Rings.

2501

From E. C. Atwood, Florida.—Some time ago I read a statement to the effect that when installing a leak-proof ring it should be placed in the lowest groove.

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What do you think of the No-Leak-O oil sealing rings? What is your rule for installing leak-proof rings?

Reply.—You are laboring under a misapprehension in saying that a leak-proof ring should always be placed in the lowest piston ring groove. We hold to the following rules: If an automobile engine is fitted with a splash lubricating system and trouble is experienced in oil leakage into the combustion chamber, a leak-proof ring should be installed in the lowest groove. If, however, oil trouble is not experienced, but there is a leakage of fuel past the rings into the lubricant, then the piston ring should be placed at the top of the piston. As a general rule the former is the case, and that is why we usually suggest that the ring be placed at the bottom. In the older engines, where there is an excessive compression, we always suggest that a full set of rings be used; as a matter of fact, at least two rings should be used upon every piston, if satisfaction is desired.

In every case, you understand, we speak of leak-proof rings. We do not think that with leak-proof rings on the top, oil leakage into the explosion chamber is increased.

If there is still any doubt as to the proper location of the ring, place it at the bottom. In this way the ring will prevent upward-leakage of the oil, it will be protected from excessive compression by the rings above it, it will not be subjugated to the excessive degree of heat, as it would were it at the top; yet it is upon the piston, where it is needed.

We gladly recommend No-Leak-O oil sealing rings The writer has had experience with this particular ring and finds that it compares favorably with other types.

Welding with Electricity.

2502

From J. A. Fay, Louisiana.—We have a 110-volt direct current supply at our disposal and would like to use it for brazing small brass castings, can you give directions for this?

Reply.—There is no way in which you can use your 110-volt direct current generator without changing it or reducing it to the proper voltage by means of a coil. The General Electric Co., of Schenectady, N. Y., manufactures a small shop welding apparatus which can be attached to a line. We might suggest that you write them for details, giving them your source of current voltage and other information.

It is very possible that you may be obliged to install a special set of wires to carry the heavy current.

Removing Carbon Deposits.

2503

From L. E. Child, New York.—I have a model R Schebler carburetor which is heated through a jacket by exhaust gases. The exhaust deposits carbon in these passages, and I would like to know how to clean the jacket.

Reply.—The carbon may be removed by plugging up the lower outlet of the exhaust chamber and filling the chamber with paint remover. Allow the paint remover to remain in the carburetor for about twelve hours. Most of the carbon will be dissolved in the liquid and can be drawn out with a paint remover.

In addition to this be sure to loosen up all carbon possible by the use of a flexible wire.

Kerosene will answer the same purpose to a certain extent, but is far from efficient.

Over-Size Tires and Speedometer.

2504

From W. B. R., Illinois.—I have a Dodge Bros. car which was formerly fitted with 32 by 3½-inch tires, but have put on over-size tires, making them 33 by 4. Can you tell me how much this affects the speedometer?

Reply.—We doubt very much if the accuracy of the speedometer will be affected materially. As a matter of fact the actual difference between the former reading, which was supposedly correct, and the present reading will only be one mile in every thirty-three miles.

In other words, every time you travel thirty-three miles your speedometer will register but thirty-two, or an error of slightly over 3 per cent. The same thing is true about the speed in miles per hour and the percentage error is the same. That is, if you travel thirty-three miles per hour, your speedometer will register but thirty-two. A speedometer, however, is seldom accurate. It is very easy to travel the same ground twice and get a different speedometer reading. You can try it by yourself if you care to, over a measured distance.

Try it first with the car empty and the tires fully inflated, then go over the same distance with a full load and the tires partially deflated. If you look for accuracy, however, you can add .034 to your speedometer readings to get the actual figure. If your speedometer, for instance, registered 200 miles, you would multiply this by .034, giving you 7.8 miles, which added to the 200 would show that you had gone 207.8 miles in all.

Knock in Studebaker.

2505

From A. L. Pollard, California.—There is a distinct knock in my Studebaker car which seems to be in the first cylinder. On starting the knock is evident, then it decreases until a 15 m.p.h. is attained, when it begins again. The knock seems to occur when cutting down the gas or when drifting down an incline.

The connecting rod bearings have all been examined and tightened and the main bearings are all right. I have put in new rings and oil. Retarding the spark does not stop the knock. Can you tell me the trouble?

Reply.—The trouble with the Studebaker car may be in a number of places. In the first place, we should advise you to locate the knock more definitely. You can do this by placing a stick between your teeth and pressing it against various parts of the engine until you have found which cylinder or part of the engine is nearest the knock. We would be inclined to think that the knock

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is in the flywheel, which may be loose upon the shaft, or else it is possible that the knock is in the clutch mechanism, or the clutch itself, which may be loose upon its mounting.

Examine these units first, then try, if you do not find it, to locate in which cylinder the knock is loudest. If it is not the cylinder and is in the connecting rod, it may be a loose wrist pin or a loose wrist pin bushing.

If it is not, then examine the piston rings and see that there is no end play in them. A loose piston ring will cause a severe knock under certain conditions. While you have the engine pulled down be sure to examine all of the main bearings and the connecting rods again very carefully. Examine the cylinder walls and see that there are no grooves or edges. Be sure that the plug in the top of the cylinder does not extend too far into the cylinder. It is upon this plug that the water manifold studs are mounted.

Overcharging a Battery.

2506

From G. W. Schraeder, Washington.—I have a 1918 Dodge Bros. car and it is fitted with a 12-volt storage battery. If the battery is fully charged when the car is being run, is there any danger of overcharging it? Should I run the battery down once it is charged, and how?

Reply.—It is very evident that you do not use the lights sufficiently. If the battery is fully charged at all times, we should advise you to leave the side lights dimmer, or the tail and dash lights going all night. In this way you will draw upon the storage battery and discharge it to a certain extent.

Don't light all the lights at one time, however; don't light the big headlight bulbs; draw just enough current so as to discharge the battery. Very often a storage battery will not give good results if it is kept charged at all times and gives the most satisfaction if it is partially discharged, at least twice a month.

Difficulty in Starting.

2507

From Olaf Stranne, South Dakota.—I own a Metz car, model 25, and have great difficulty in starting it. I usually have to spin it quite a bit before it will start. It is fitted with a Bosch magneto. If I remove the plugs and place them, connected, upon the cylinders and spin the engine, I do not seem to obtain very much of a spark; at times there will be no spark at all.

The compression is good, the power is excellent and once the engine is started it will run perfectly. Can I use batteries to start upon?

Reply.—Your difficulty in starting is undoubtedly due to trouble in the Bosch magneto. It is very probable that the breaker points are badly worn or poorly adjusted.

The breaker points should be absolutely flat to contact their whole surface when they come together and when the arm is right on top of the cam. The breaker points should separate .025 of an inch. Remove the magneto from the car and make this breaker point adjustment; then whirl the armature by hand, connecting each of the spark plugs with its distributor wire and connect the base of the spark plugs with the base of the magneto. You may be obliged to make a number of breaker-point adjustments until you find the point where the biggest sparks occur.

Clean the magneto thoroughly, pay special attention to the safety spark gap; this spark gap is locked in a little porcelain cut between the magnets.

If the breaker points are badly worn, replace these with new. You cannot use this particular magneto in conjunction with batteries, nor should it be necessary if the magneto is working properly.

What Is Pulsating Current?

2508

From H. M. Wineberg, Pennsylvania.—Will you kindly tell me what the correct designation is of the current flowing in the wires from the coil to the spark plug? Is it Alternating or Pulsating?

What is a clutch brake on a 1915 Overland car? What is it for?

What is the right way to run a car on compression? Is an engine running on compression or on a vacuum when the switch is open, the throttle closed, and the car coasting down hill?

Reply.—In speaking of electric current but two names are used, namely: direct and alternating current. Though the word pulsating is used by a few people, it has no more meaning than intermittent and is not a strictly electric term. The current flowing in the primary wires of any spark coil excited by a battery must be direct; in the case of the Ford system the primary current is alternating. In all cases the secondary current, or the current flowing from the coil to the spark plugs, is high tension alternating.

The clutch brake in a 1915 Overland car is designed to prevent the spinning of the clutch when the clutch is disengaged. The harder the clutch pedal is pressed downward, the harder the clutch cone presses against the clutch brake. It is a device through which the driver can control the speed of the clutch cone and retard the speed of the cone, so as to conform with the speed of the gears, which are being meshed in the transmission gear-set.

To use your terms in answer to your third question: The engine is being run upon compression—that is to say, the compression of the engine is being used as a brake when the throttle is wide open and the switch off. Both the compression and the vacuum of the engine are being used as a brake when the switch is off and the throttle closed.

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Four and Six Cylinders.

2509

From M. P. Neighbor, Pennsylvania.—Will you kindly tell me the advantages of six-cylinder engines over fours? Many dealers say that a four-cylinder machine has more power and runs just as easily as a six. If this is true, it is difficult for me to see the advantage of investing more money in a six, since the operating cost of a six must be greater.

Reply.—In our opinion a six-cylinder engine is a better proposition than the four, for the very reason that the power impulses are more evenly distributed. In a four-cylinder engine there are two explosions to every revolution. In the six, however, there are three explosions to every revolution. In the four-cylinder engine there are two dead center points, whereas there are none in the six. In the six-cylinder engine there is a constant overlapping of power impulses, whereas in the four there is a break in the power impulse every half revolution.

We are not willing to agree with you that the operating cost of a six-cylinder car is greater than of a four. As a matter of fact, in comparing two engines of the same horsepower, the six-cylinder machine will give its power at a lower cost than the four. We would call your attention to the mileage records of the Hudson Super Six and the Buick Little Six as compared with four-cylinder engines and even less power than these machines. We might liken the advantage of a six over a four by the following example:

Suppose you were dragging a heavy load over a smooth floor and you applied your power evenly and smoothly. The load would be drawn along the floor with a minimum amount of effort. This power application compares with the application of a six-cylinder engine. Suppose, however, as in the four-cylinder engine, instead of pulling smoothly, you accomplish the result by a series of jerks. The load would slow down and lose momentum and you would be obliged to "yank" it ahead again. The same result would be obtained, but more effort would be necessary.

Firing of Flanders 20.

2510

From P. C. Bradford, Arkansas.—Will you please tell me how to find the firing position of No. 1 piston and the firing order of a Flanders 20? I have tried turning the crankshaft over one revolution after inlet valve begins to open and setting distributor to fire 1-2-4-3, but it will not fire properly. If you have a wiring diagram of this car I would like to have a copy.

Do you think it a good idea to oil the valve stems on a Buick engine?

Reply.—The piston in No. 1 cylinder should be at the top dead center of its stroke, at the firing point, with the spark advanced one notch. We have no record which will show the firing order of this engine, but we will give you directions for finding same:

Remove the spark plugs and turn the engine over until the valve beneath spark plug hole No. 1 has opened and closed. The piston will then be at the bottom of its stroke. Turn the engine over still further, until the piston comes to the top of its stroke. When it reaches the extreme top the spark should occur in the plug. While the piston is rising in the cylinder inspect the intake valve of No. 2 or 3 cylinder. You will notice that the valve in one of these cylinders is just closing and is probably closed when the piston in No. 1 has reached the top of its firing stroke. The cylinder in which the inlet valve has just closed fires next in order.

We have no wiring diagram of this car.

It is a good idea to oil the valve stem on the Buick engine.

Magneto for Jump Spark.

2511

From J. W. Wuerth, Kentucky.—We are rebuilding an old Maxwell car and want to run it on a magneto. We have on hand an old magneto marked "for use with make and break spark only," which was removed from an old stationary engine and was run by a friction pulley from the flywheel.

Do you think it possible to use this machine with an induction coil for jump spark ignition? If not, why not?

Reply.—We see no reason why you cannot use the old magneto for jump spark ignition, providing you can find the coil of the vibrating type which will transform this current to high tension, though it is possible that the current is not of sufficient voltage at all times to excite the coil. Only an experiment will prove this.

We have tried to find just how this old machine is wound, but cannot seem to obtain any data concerning it. When experimenting with it, use any six to nine voltage vibrating coil.

Poor Compression.

2512

From N. Phaneuf, Connecticut.—I have a Liberty Six, 1917 model car and am not satisfied with the power, which is poor, due to poor compression. I have been advised by the agent to install a new leak-proof ring at the top of each piston, but this does not seem to remedy the trouble, it still has poor compression. Do you think that a full set of leak-proof rings would be advisable? If I can only remedy this trouble the car will give complete satisfaction.

Reply.—We would advise you to have a full set of leak-proof rings installed in the engine. Before doing this, however, be sure that the cylinders are absolutely round and have not been worn egg-shaped. We would advise you to have the agent examine the oil level in this car and be sure that the oil pans are not too deep. We would not advise one ring in each cylinder because we do not think that you will secure satisfaction. A full set should be used.

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Salvaging an Old Engine

How an Old and Worn-out Engine Was Rescued from the Scrap Heap and Put Into Condition Without Expensive Machine Work

BY W. O. MANN

EVERY once in a while someone who wants a gasoline motor, but either cannot or will not go to the expense of buying one in good condition, is offered the opportunity of acquiring a machine that is "all there," so to speak, so far as its parts are concerned, but is much the worse for wear and tear and looks more like junk than anything else. The price, therefore, will be "away down." Then the question arises, "Can the old mill be put in something like running order without the expenditure of a lot of money?"

Here is the story of the overhauling of such an engine, and the pivotal point is, that a miserable old rattle-box was converted into a good engine at almost no cost, except that of time. In fact, when the job was finished the engine was in some respects better than it was when it was new, though of course there was a certain amount of deterioration that was not to be offset except by rather expensive methods. At any rate, the power was at least fully equal to that of the new engine and the running was perfectly smooth and steady.

An Old "Rattle-Box."

To begin with, there was the engine. It was an obsolete model. The manufacturers had gone out of business years ago, and as the engine was of rather queer, though fairly good design, there was no possibility of obtaining any spare parts. This meant that all the old material must be used or else new parts must be made especially. As this involved a lot of expense it was given no further consideration, and work was commenced with the idea of making the best of things as they were. This worked out all right except in one respect. The piston rings were poor affairs to begin with, and they were not only badly worn and leaking, but they had been made of such inferior material that they had practically no spring.

Merely removing them from the pistons caused them to take a permanent set. As, however, they were of the same size as the rings in a certain very well-known engine, replacing them was a simple matter and involved little expense, though the outlay was much greater than for all the rest of the overhauling put together.

The shop equipment consisted of an ordinary—very ordinary—bench with a carpenter's vise, a little steel vise with two-inch jaws, such hand tools as files, screwdrivers, hammers, chisels, pliers, hack-saws, punches, a hand drill with a maximum capacity of 3/16 inch, soldering materials, melting ladle, calipers, squares—in fact, just the tools that are found in the shop of any amateur mechanic who hasn't much money to spend on his equipment. There was a Bunsen burner, a grindstone, a slab of iron for an anvil, *et cetera*. As it turned out, these common tools were sufficient for the job, strange though it may seem.

Problems turned up from the very beginning—problems that would not have required a moment's thought with a more complete outfit available. The motor was unspeakably smothered in a two-years' accumulation of oil and dust, the removal of which, though only an incident, was a job in itself, but after that, the engine had to be completely taken apart, for the bearings of every sort were so badly worn that it was a wonder the engine ran at all, toward the end of its period of activity.

Taking off the cylinder head, manifolds and other "excrescences" was no trouble; everything was so soaked with oil that nothing was rusted. When it came to the camshaft, however, it proved that one end had a bearing in a blind bushing while the other, which carried the gear, was in a bushing set into a round plate fastened to the crankcase casting with cap-screws.

The cap-screws were covered by the gear, so that the gear had to be removed first of all. It was tightly fitted

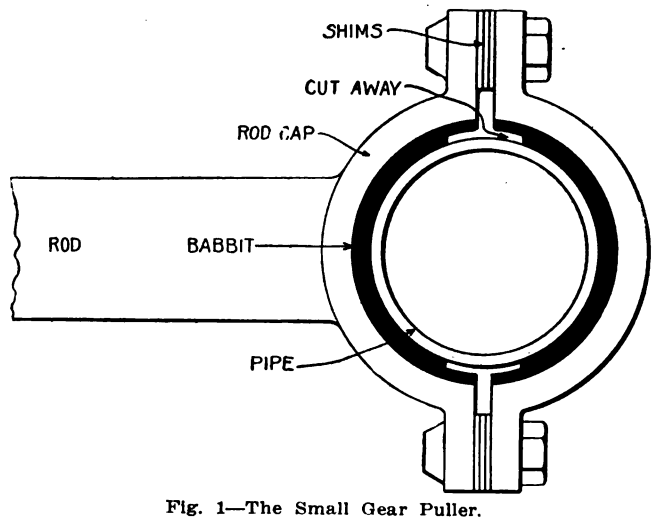


Fig. 1—The Small Gear Puller.

to the shaft and had a taper pin through hub and shaft. The pin was quickly driven out with a punch, but a little cautious tapping and prying showed that considerable force would be needed to pull the gear off its seat. That meant a little gear-puller, and one was made in half an hour.

The Gear Puller.

The yoke was made of a big iron washer, the hole in which was a little smaller than the outside diameter of a ½-inch hexagon nut. The nut was shouldered off with a file until it could be driven tightly into the hole in the washer. Then two slots were cut at diametrically oppo-

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site points in the edge of the washer, just big enough to take ¼-inch bolts. It would have been just as well, perhaps better, to have drilled for these bolts, but—well, anyway the slots were sawed out and they answered the purpose. A ½-inch bolt with the end filed to an obtuse point was screwed into the nut in the washer and the implement was complete, as shown in Fig. 1.

The gear was webbed, and there were half-inch holes in the webs. The quarter-inch bolts were passed through two opposite holes and washers and nuts put on back of the gear. The heads of the bolts were slipped into the slots in the big washer, the central bolt screwed down until its point entered the center in the camshaft, and a few turns with a wrench brought the gear off without the slightest trouble.

Of course the reduced part of the central nut must be on the under side of the big washer, so that the shoulder can take the pull. Once the gear was off the cap-screws holding the bushing plate were removed and the plate taken out, leaving an opening large enough for the camshaft, cams and all, to pass through.

Then came the crankshaft. The bearing at the flywheel end was a bronze bushing with babbitt lining, fitted tightly into a seat bored in the crankcase casting—which, by the way, was not of the split kind and was integral with the cylinder block. The bearing at the front end, like the camshaft bearing at the same end, was a bushing set into a round plate, but as this plate was quite large the cap-screws holding it were clear of the pinion that meshed with the camshaft gear. By taking out this plate an opening was left large enough for the crankshaft to pass through.

A Tight Flywheel.

Unfortunately, however, this engine was like most engines in having a flywheel on the back end of the shaft, and before the shaft could be pulled through the flywheel had to come off. The wheel was set up on a taper with a Woodruff key and held in place by a nut. The nut came off all right, but at that point proceedings halted, for hammer-blows on the end of the shaft—with a piece of copper to protect the shaft—did not have the slightest effect, and though it is probable that heavy blows would have done the business, such a proceeding is risky because the webs of the shaft may be sprung, or the crankcase casting might be cracked. Here, obviously, was another wheel-puller job—but a comparatively big one. No puller was available, but the old wheel came off just the same. A rooting process in the junk pile brought out a ¾-inch bolt 8 inches long, together with a washer, a piece of ordinary 2 x 4 scantling and a length of flexible wire clothesline. Two pieces of scantling were cut, each six inches longer than the diameter of the flywheel, and they were nailed together to make a piece 4 x 4.

In the middle of the piece, and following the joint, a hole was bored big enough to let the big bolt pass through easily. The end of the bolt was filed to a point, just as was done with the center bolt in the little wheel-puller, and the apparatus was ready for business. One other thing was done. One of the washers of the big bolt was split radially with the hack-saw, from the circumference almost, but not quite, to the hole, and the edges of the split were bent in opposite directions, precisely like the holding points of a lock-washer and—note this—in the same directions.

The bolt was put through the hole in the wood and the doctored washer slipped on, followed by the nut. The wooden yoke was laid across the face of the flywheel and the steel wire clothesline passed around its ends and back of the wheel several times, as tightly as it was possible to pull it. Then the bolt was screwed in until the point rested in the shaft center and the nut bore against the split washer, which had one of its upturned edges forced into the wood, while the other stuck up and held the nut from turning, as shown in Fig. 2.

The Flywheel Came Off.

Then the wrench was applied to the head of the bolt. Gradually the turns of wire tightened, pulled out straight and began to sink into the wood. When the pressure was quite heavy, the head of the bolt was given a good smart rap with a hammer and—well, what actually happened was that the flywheel suddenly left its moorings and fell on the unfortunate mechanic's foot, imparting a limp that lasted the better part of two weeks. But the flywheel came off, which was the main thing, the rest a mere incident.

Of course the valves were taken out, together with their springs and lifters, and the connecting-rods and pistons were also removed, so that the crankshaft made its exit without further delay.

An inspection of the bushings showed that there was a tremendous amount of play in the one at the flywheel end of the crankshaft, a small amount at the other end, and a good deal in both camshaft bushings. The camshaft bushings were plain bronze, the bushing for the flywheel end of the crankshaft bronze with babbitt lining, and the other crankshaft bearing—there were but two—plain bronze.

Starting on a small job first, the play in the camshaft bearings was taken up. The way this was done would make a regular mechanic froth at the mouth—but it worked and has given real results, though there are those who are unkind enough to say that they don't see why it should. The bushing at one end was a blind one—that is, one end was closed. The inside was carefully cleaned with sandpaper—emery sticks in the metal—and treated with soldering flux. Then it was poured full of melted babbitt which was "rubbed into" the surface with a swab of asbestos string wound on the end of a stick.

A Babbitt Bearing Surface.

When the babbitt was poured out a smooth coating was left on the inside. It was found that the coating was very uniform. Its thickness can be controlled to

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some extent, for the cooler the melted metal becomes before being poured out of the bushing the more will be left behind, and vice versa. After three trials a coating was obtained that just permitted the shaft to be forced in.

This allowed for smoothing down the inequalities of the soft metal and getting a good fit by putting a little coloring matter—red lead or blue mixed with lubricating oil to a thick-cream consistency—on the shaft and forcing it into the bushing, and then working down the spots where the marking showed contact. In this way a good job was actually made of both camshaft bearings and the bushing at the end of the crankshaft opposite the flywheel.

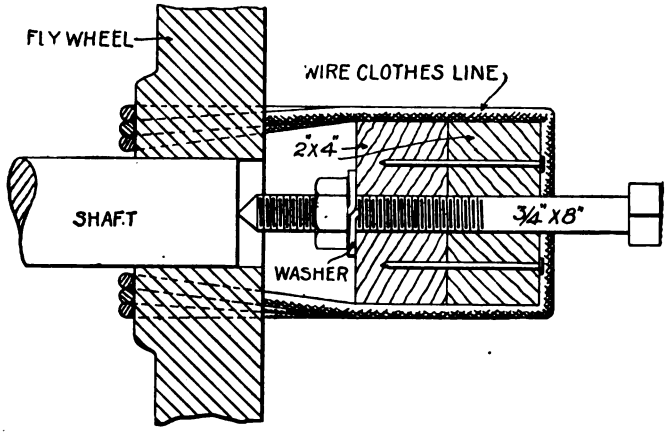


Fig. 2—How the Flywheel Was Removed.

(To Be Continued)

WHY THE CRANKCASE SHOULD BE CLEANED THOROUGHLY

DO you now and then drain the lubricating oil from the crankcase of your engine and put in fresh oil? This is one of the most important details in the efficient operation of your car and should be done at regular intervals. Automobile manufacturers and service stations alike emphasize its importance.

Upon examination of the old oil in the crankcase you will probably find that it has been thinned out in use. Chemical analysis would show a varying proportion of gasoline in the oil, dependent upon the lubricating conditions of your engine and the length of time the oil has been allowed to remain in the crankcase.

Not infrequently upon examination the lubricating efficiency of the oil has been found to be seriously impaired. The principal reason for the increase of this trouble in recent years is the change in the character of the fuel (gasoline) in general use.

Present-day gasoline is of heavier gravity and is less volatile than that formerly sold. It does not as readily saturate the air in carburetion and give as homogeneous or gaseous a mixture as is desirable. The heavier and less volatile the fuel the greater the difficulty of mixing it with air in the correct proportions for combustion. There is, therefore, a greater possibility of fuel in liquid form being drawn into the combustion chambers or cylinders of the engine.

In starting the engine, particularly in cold weather, the use of the carburetor choker valve causes a considerable quantity of liquid fuel to be drawn into the combustion chambers or cylinders. If the cylinder or combustion chamber temperatures are lower than the temperature of the fuel mixture entering, then a partial condensation occurs. Part of the fuel separates from the air as a liquid.

This liquid fuel has a natural tendency to dilute or thin out lubricating oil, with which it comes in contact. As the piston moves up and down within the cylinder, the liquid fuel in contact with the oil film on cylinders, pistons and piston rings, partially cuts away this lubricating oil film.

The compression pressure on the compression stroke aids in forcing the compressed fuel charge down past the piston rings. Then the fuel charge and the liquid fuel mix with the lubricating oil in the crankcase and dilute it.

The amount of fuel which reaches the crankcase and mixes with the lubricating oil depends largely upon the correctness of the lubricating oil used and its ability to form and maintain a thorough piston ring seal, which will prevent the escape of the fuel charge and liquid gasoline past the piston rings into the crankcase.

When the gases or fuel have mixed with the lubricating oil in the crankcase they reduce the lubricating oil in body and considerably decrease its lubricating value. This results in:

1. An inefficient piston ring seal with consequent high consumption of fuel and lubricating oil and loss of power.
2. Premature wear of cylinders, pistons, piston rings and of crankshaft, crankpin and piston pin bearings.
3. Excessive carbon deposits causing pre-ignition and laboring of the engine.
4. Burned out bearings.
5. Poor compression.
6. Excessive accumulation of carbon sediment in crankcase.

To overcome these conditions it is of the utmost importance:

That the carburetor choker valve be used sparingly.

That during the cold weather a means be provided to decrease the circulation of air through the radiator, thereby enabling the engine to operate at a higher temperature.

That the supply of used crankcase oil be frequently drained and replenished with a fresh supply; and

That the correct grade of lubricating oil be used to form and maintain an efficient piston ring seal.

(Written from data supplied by the Vacuum Oil Co., New York, N. Y., manufacturers of Gargoyle Mobiloils.)

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The Metal Turning Lathe

Part 2.—Various Types of Tool Post Feeds, The Speeds of the Work for Different Kinds of Metal and Rotation at Various Diameters

BY J. F. SPRINGER

THE power-driven turning lathe in the form known as the engine lathe, when provided with usual accessories, is probably the most useful of all machine tools. It is competent to do not only its own proper work, but also a good deal of work that is ordinarily done on other machines—as for example, drilling holes, grinding, etc.

The modern lathe is driven by a belt-operated cone pulley, by a geared head operated by a plain belt-driven pulley, by the individual electric motor combined with a geared head, etc. The most usual thing in an ordinary small shop is perhaps the cone pulley drive operated by a belt from a corresponding but reversed cone pulley on a counter-shaft.

The object of the various steps on the cone pulleys is to provide for changes of speed of the lathe spindle. When the belt is on the smallest step of the cone pulley mounted on the spindle, it is in shape to obtain the highest spindle speed. As the belt is shifted from one step to any larger step, the rate of spindle rotation is decreased. One of the objects in view in changing the speed of the spindle is to keep the work at the proper cutting speed. This remark will perhaps become clearer after some explanation.

Tool Post Feeds.

The cutting tool is fed to the work in two directions: It is fed longitudinally with the length of the lathe, and it is also fed towards the center of the work in a direction perpendicular to the other feed. The combination of the two feeds determines the rate at which metal is removed.

Consider now a piece of metal held in the jaws of the chuck. Suppose it is purposed to machine the face of this work, beginning on the outer edge and working in towards the center. A suitable combination of longitudinal and transverse feeds is first adopted. The work will pass the nose of the cutting tool at some definite rate of speed—say, 40 feet per minute. This means that the chip is coming off at this rate.

Suppose now both feeds are kept at just the same speed and an unaltered spindle speed is maintained (*i. e.*, its number of turns per minute). When the tool reaches too near the center the chip will be cut off at a very slow rate—nothing like 40 feet per minute. The chip may be cut at only four or six feet in a minute's time.

This is, of course, all wrong, time is being wasted at this extremely slow cutting speed. If 40 feet per minute is right at the beginning, it will be right generally throughout the cut from start to finish.

We could make the chip heavier by increasing either the longitudinal or the transverse feed or both; but this will often be inadvisable. It will be quite easy to do something else. That is to increase the rate at which the spindle turns. What we want to do then is to speed up the spindle from time to time with the view of maintaining the cutting of the chip at the rate of 40 feet per minute. Consequently, we begin work with the belt on the big end of the cone pulley, and, as we work in towards the center in making our cut, we shift the belt from step to step. When we get down to the smallest pulley, we will have the most rapid rotation of the spindle possible.

Various Cutting Rates.

We have been talking about 40 feet per minute as a rate at which the chip came off. As a matter of fact, there are various rates of cutting speed. They differ with different steels. With modern high speed tool steel as the cutting tool, we can use rather high rates. With the usual carbon tool steel, a more moderate rate is best.

For a good average cutting steel, 40 feet per minute is a fair rate, when cutting low or medium carbon steel. If we have to cut high carbon steel, we may adopt a somewhat slower speed or else reduce the size of the chip.

It's a very good idea to find out whether we are running our lathe right—that is, whether we are using the proper speed, considering the kind of metal in the work and the kind of metal in the tool. We may be running much more slowly than we need to run. But, how are we going to find out the rate at which the chip is coming off? It is very easy to say that it should peel off at the rate of 40 feet or 50 feet per minute. But, how are we going to find out?

Well, there are two or three ways. The easiest way is to make use of a special instrument called a *cut meter*. We hold it against the work and readily determine the speed in feet per minute at which the work is moving, at the point of contact with the instrument. We haven't anything much to do except hold on to the instrument and read off the number of feet. We use a watch or a clock to give the length of time.

Using the Cut-Meter.

The calculation will be a simple one. If the instrument has a rubber-tired, small wheel, which is to be held against the rotating work whose diameter is such that the circumference is just four inches, then all we have to do is to divide by three the number of turns indicated on the dial during one minute. We shall have at once the number of feet per minute. One turn gives us four inches—that is, 1/3 foot. If we have 130 turns shown by the dial in the course of one minute, then we

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have 130 x 1/3 as the total distance covered in one minute. That is, we get at once 43 1/3 feet for the one minute's work.

There is another way of getting at the speed at which the chip comes off. This method calls for a little calculation. We first find out the spindle speed. How this is done was explained in our former article. We then have the number of turns per minute made by the work. We next measure the diameter of the cut we are making. By multiplying this diameter by 3 1/7 we will obtain the length of the chip taken in one turn. Suppose we measure the diameter and find it to be 3½ inches. Multiplying by 3 1/7, we obtain 11 inches. That is, every time the work makes a complete circuit, we take off 11 inches of chip. Suppose now that the spindle was going at the rate of 46 turns per minute. Then the total length of chip in one minute would be 46 times 11 inches. This is 506 inches, or slightly over 42 feet.

Speeds for Special Work.

Now 46 turns of the spindle per minute is a pretty slow speed. Our arrangements with the line shaft, counter-shaft and cone pulleys may or may not be right to take care of this speed. Sometimes very slow speeds are gotten by using back gearing on the head-stock of the lathe. But we should not need to resort to the back gears in order to handle an ordinary cut of 3½ inches diameter. We should be able to take care of it with the belting arrangements, using the big end of the cone pulley.

If, for any work that has to be done, especially if there is a good deal of it, it should be necessary to make special arrangements for a slow spindle, we may put a small pulley on the line shaft and a big one on the counter-shaft. This may seem cheaper than buying a lathe fitted with back gears.

GLITTERING CARS.

By WALT MASON.

Some poet wrote, in days of old, "All things that glitter are not gold." The poet's head was large and long, his intellect was working strong. There were no flies upon that bard, who sprang the truth, and sprang it hard.

All things that glitter are not gold; we wouldn't be so often told, if haply we'd remember that, and post the maxim in our hat. The junk that fakers want to sell will often look surpassing well, but when it's used it comes to pass that shining gold is only brass.

I bought two diamonds long ago; they cost me eighty bones a throw. I held them proudly in my hand, and there they shone to beat the band. I bought them from a stranger slick, who found in me a trusting hick. I swallowed all his helpful bunk, and handed him my bottom plunk. And in a month the stones were dead; no gorgeous radiance they shed. The man who bilked me was a peach; those gems were worth just eight cents each.

The poet said, "Oh, boys, behold! All things that glitter are not gold!"

The man who goes to buy a car down where the blithesome agents are, should keep the maxim in his mind; it isn't safe to go it blind. Some shining paint and nickel plate will make a tinhorn boat look great. The buyer, take it as a rule, is quite an easy man to fool. He knows no more about a boat than Uncle Ezra's billy-goat. He doesn't know or want to know what makes the dog-gone inside go; but he would like a fool-proof car, in which a man may journey far without it coming all apart and rupturing the owner's heart.

He ought to buy a car that's made by men of standing in the trade. Have they been in the business long, and are their fame and credit strong?

He should remember that the Haynes was first to hit our native plains, and all the time it's kept abreast of everything that's first and best. That is the safest guarantee for easy marks like you and me.

The poet said, "Our feet grow cold, for all that glitters is not gold."

THE WHY OF A LUBRICANT.

There Are a Number of Old Superstitions About Cylinder Oil Which Should Be Dispelled

THERE is a mistaken idea among motorists that the best cylinder oil will not carbonize, and one of the tests that many car owners make is to place a drop of lubricating oil upon a hot plate. If the oil evaporates and leaves no residue, they consider it a good lubricant.

There is another class of motorists who believe that the oil when placed upon a hot plate should not evaporate at all. There is still another class of motorists who think that they can judge a good lubricant by the "feel" of it. That is, they place a drop between their thumb and index finger and see whether it is slippery or not. If it is not, they immediately condemn the oil as being poor.

Of all these tests, the last one is perhaps the best, but who of us is capable of judging oil by its "feel?" The average motorist can judge an oil only by the results obtained, not by any ordinary test that he may make.

There are many stringent requirements which must be met in a gasoline engine before the lubricant may be considered perfect. In the first place, one must thoroughly understand that any oil to contain lubricating qualities must contain carbon. Necessarily then, it will carbonize in the cylinders under intense heat.

The heat in the combustion chamber at the time of explosion is above that required to melt iron. At that temperature any lubricant will be evaporated to a certain extent, then it must leave a residue.

There is one large oil company whose chief argument is that their lubricating oil does carbonize, though its point of carbonization is extremely high. Under ordinary engine heats, a good lubricant will not carbonize rapidly, then if it does, the rate will be so slow that the carbon will be driven off through the exhaust.

The specific gravity of an oil cannot be used as a

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basis of judgment. It is only the combination of all its qualities that determines a good lubricating oil, and it is safe to say that an oil marketed by a reliable concern for a particular purpose will give satisfaction providing it is used for the purpose for which it was intended.

This is true of automobile lubricants. If the car owner is satisfied with the results he is obtaining from a certain kind of oil, he should never change to another. The best oil is not the cheapest, though the cheapest oil may sometimes give as good results as that costing more. Therefore, never use the price as an index of quality.

If you do not obtain satisfaction from a medium or light grade of cylinder oil, do not think that your trouble will be remedied by using a heavy grade in every case. The fault may lie in the oil, not the grade. Experiment with various oils until you have found the one which gives the most satisfaction. Then stick to it. Further change is entirely unnecessary.

NEW AND INTERESTING THINGS IN MOTORDOM

A New Correspondence School.

A short time ago we announced the discontinuance of the technical school of New York, a school which was founded originally by the carriage makers of the country to train young men along the lines of body makers and designers.

The principal of this school, Mr. Andrew F. Johnson, has founded a correspondence school at Gray, Maine. In this school pupils will be trained to design both automobile and carriage bodies and a complete course in mechanical drafting as well as a course in free-hand drawing is given.

Mr. Johnson for twenty-six years has been a practical designer of bodies and is considered an expert in his line. His course is very complete and practical and the principles taught have formed the basis of the success of many men who are now prominent in the body part of the automobile industry.

Upon completion of the course certificates of graduation are furnished to those who pass the examination successfully. The students are kept informed just how they stand at all times. At the present time there is a great dearth of automobile body designers and any young man who contemplates entering a trade should consider the possibilities held open for him in this line of work. Full details concerning the correspondence course may be obtained by writing Mr. Andrew F. Johnson, Gray, Me.

Lazco Spring Lubricators.

Motorists are beginning to realize that there are automobiles giving 100% more satisfaction and ride much easier if the springs are kept lubricated.

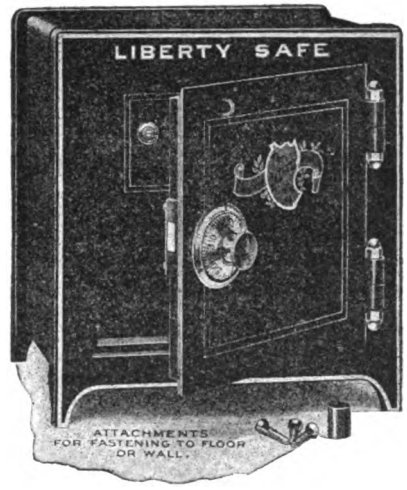
Many motorists who heretofore have used shock absorbers, find that with the springs lubricated a machine rides as easily without the shock absorbers, as it did before the springs were lubricated, with the shock absorbers, and when the shock absorbers are applied, the machine gives as much satisfaction as a high priced car.

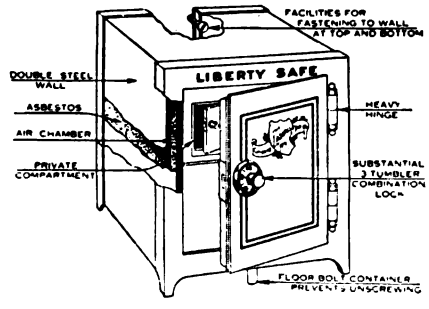
The Lazco Spring Lubricators are designed in such a way that they may be attached to practically any width of spring. They provide an oil reservoir on each side and an automatic wick feed which supplies the springs with oil at all times. The price is low and motorists who are interested in an easy riding car should write the Lazarus Mfg. Co., 750 Prospect Avenue, Cleveland, Ohio, for further particulars.

Lazco Liberty Safe.

The Lazarus Manufacturing Co., of Cleveland, Ohio, have placed on the market an all-metal home safe. The manufacturers state it is fire and burglar proof, can be bolted to the floor or side wall and a protection every home should have.

This safe should prove an ideal protection for thrift stamps and liberty bonds, and as their literature states, bonds are negotiable and if stolen can be spent the same as money, if destroyed by fire, cannot be replaced.





SECTIONAL VIEW SHOWING SUBSTANTIAL CONSTRUCTION

The Liberty Safe.

Westinghouse Marine Expansion.

So imperative have become the demands for marine electrical propelling equipments, especially for Emergency Fleet Corporation, that the new Essington plant of South Philadelphia, of the Westinghouse Electric & Manufacturing Company, has been placed in operation for the exclusive promotion of this type of equipment.

At the Essington Works is produced the complete propelling equipment for merchant vessels. This equipment consists of practically every part between the boiler plant and the propeller of the vessel. At the present time there are 350 complete equipments on order or under construction.

The significance of these orders can better be appreciated when it is considered that they include steam turbines, reduction gears, condensers, condenser pumps, small turbine generator equipment for lighting, stern tubes, propeller shafting and propeller shaft bearings.

The largest equipment is 12,000 shaft horsepower, and none are less than 1,500 shaft horsepower. The equipment manufactured by this company has been tried out upon many oil tankers, freight and passenger ships and other vessels now actively engaged in trans-Atlantic service.

Amazon Rubber Company Takes Over O'Neil Tire Accessory Business.

A recent development of considerable interest in the tire world is the purchase of the tire accessory business of the O'Neil Tire & Rubber Company by the Amazon Rubber Company of Akron.

In discussing the matter, L. J. Schott, general manager of the Amazon Rubber Company, stated:

"Mr. W. J. O'Neil is one of the pioneer manufacturers in his field and for over ten years has produced a high-grade line of tire accessories which have enjoyed a nation-wide distribution and have been decidedly popular with every dealer in the country.

"The purchase includes the exclusive right to the name "O'Neil" as an accessory trade name, all unfilled orders on hand, and the good will of their trade.

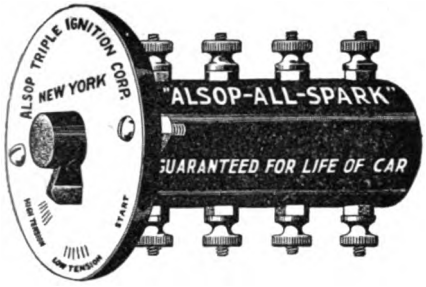
"We realize that there will now be a crying need for dependable tire accessories which will enable the car owner to secure every possible mile of service from his tires. on account of the decreased production and the necessity of conserving the rubber supply of the country.

"We will conduct this new addition to our business on a much broader scale, and under the name of "O'Neil Pioneer Accessories" will place before the trade the highest quality reliners, wing blowout patches, lace-on boots, cementless patches, etc."

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Alsop-All-Spark.

In the last issue of this magazine we gave a short description of the Alsop-All-Spark Ignition System, but failed to give the manufacturer's name. This device is manufactured by the Alsop Triple Ignition



Alsop-All-Spark Ignition Device.

Corporation, 1765 Broadway, New York City, and seems to be entirely different from anything else ever placed upon the market.

The device is so arranged that, for starting the car, the high tension current used is of practically the same voltage and amperage as furnished by the original set of coils. As the engine warms up or as carbon is deposited on the plugs, the knob of the Alsop-All-Spark unit can be turned and the voltage raised greatly. With the increase in voltage, the spark action is increased greatly, and the writer has personally seen a sooted spark plug resume action as soon as the Alsop dial was turned to the high tension position.

Should the electrodes become short circuited by a drop of oil or gasoline, the spark will leap between them just as if the oil or gasoline were not present.

An interesting test was made recently by officers from the War Department at Washington when a Ford car with ordinary equipment was filled with lubricating oil above the average height. The engine was run until all the plugs short circuited and it would operate no longer. The Alsop-All-Spark system was then installed on it and the engine started.

Within a very few minutes the engine was running evenly and despite the fact that considerable more oil was added, it still continued to operate smoothly, and at the end of six hours the plugs were removed and found to be practically clean, despite the excessive lubrication.

Auto Top and Covers.

If "a man is known by the clothes which he wears," an automobile is judged by its top. Doubtless many of our readers consider the purchasing of a new top or new seat covers for their machines this fall, and we would advise them to write to Messrs. Buob & Scheu, 286-298 Webster Street, Cincinnati, Ohio, for their catalog and prices at which they will make tops for practically any model of car.

This concern manufactures the tops, fitting them to forms and ship them to the user ready to apply to the frame, so that practically anyone can put the top upon their car themselves, thus saving considerable money. In writing for prices be sure to give the name and model of your car.

Help Win the War.

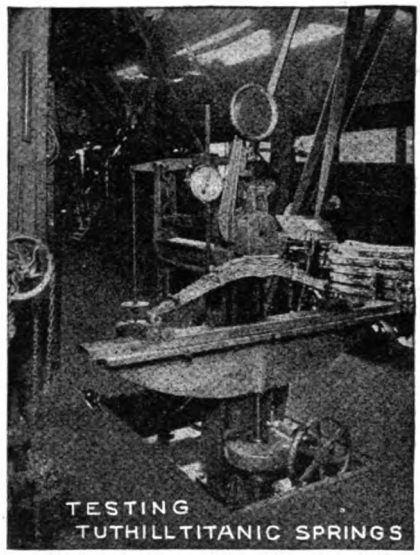
"Every pound of steel, scrap or otherwise, conserved will Help Win the War."

This is the new slogan of the Tuthill Spring Company, makers of Tuthill Titanic Springs. This company is co-operating with the War Industries Board to the last degree, and not only are they conserving steel in their own factories, but they are urging every one of the distributors and dealers to co-operate. Bulletins are being sent out and advertisements in all the automobile trade papers are asking distributors and dealers to do their part.

"It is little short of treason," says Mr. D. S. Campbell, secretary of the company, "to use one pound of steel for other than essential purposes. We must do our part; we must use every precaution in the distribution of automotive springs for repair and replacement. That is the way we can Help Win The War. The government needs steel. And every pound that is used for non-essential purposes is delaying the victory of the Allies, is giving Germany aid."

"Every distributor, every dealer has a real part to play. And when this enormous army of automobile men are really co-operating, when every ounce of steel is going into cars that are either directly or indirectly helping in government work, then we can know that we are speeding victory.

"We are doing everything in our power



to conserve. And we know that every distributor and dealer is going to do everything in his power to conserve."

Alamo Light Plant.

Never before in the history of the country has there been such a call for crops and live stock. Consequently it may be assumed that the farmer is perhaps the greatest factor in the war. He is the man that furnishes our country with the necessary provisions and is perhaps the man who has the most money to spend today.

It is easy to see, however, that the farmer's increased income will not last long unless he can obtain the necessary farm labor. The farmer appreciates this and is doing all in his power to obtain machinery with which he can replace manual labor.

The Alamo Farm Light Company of Omaha, Nebraska, manufacture a lighting equipment as well as electric generating apparatus which should be of great interest to the farmers throughout the country. The farmers, with their increased incomes, are looking for home comforts, which they have not had heretofore. Consequently they are equipping their buildings with electrical machinery and their houses with lights.

Every reader of this magazine who lives in a farm community should investigate the Alamo Farm Light Plant. If he is a dealer, an interesting proposition is held open to him. If he is not a dealer, the proposition is fully as interesting because it opens for him another source of income providing he cares to take an agency. A post card or the coupon clipped from this magazine will bring you full information concerning the lighting plant.

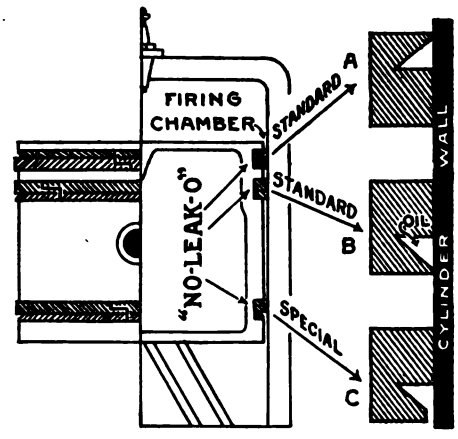
Witte Engine Works.

The Witte Engine Works of Kansas City, Mo., have recently added another large section to their factory which covers approximately 10,000 feet of floor space. This addition will be used solely for the erection of portable engines and saw-rigs which are now in great demand because of the call for wood, both for manufacturing purposes and for fuel.

The Witte Engine Works claim to be the largest exclusive kerosene and gasoline engine factory in the world which sells its product directly to the user. The factory was established in 1870 and has been continuously under the management of Ed H Witte, president and principal owner since 1884. Doubtless many of our readers desire to obtain a stationary engine which will operate upon either gasoline or kerosene and if so we should advise them to write this corporation for their catalog.

No-Leak-O Piston Rings.

The autoist probably realizes by this time that due to the low grade of fuel he is constantly troubled by the leakage of fuel into the base of his engine past the rings and the subsequent dilution of the oil. Ordinary piston rings do not prevent this leakage which often results in great damage to the cylinders and the engine, to repair which frequently costs many dollars also. There is a special type of ring called No-Leak-O oil cylinder piston ring which is unique and very practical. This ring is of the special type, and around the lower edge is cut a patented oil cylinder groove. In operation low-grade fuel is prevented from passing the ring by the square edge on the ring. After the explosion or when the piston starts down, carbon and dirt are carried out of the groove by capillary action into the firing chamber. The kerosene is thus vaporized and other foreign matter ejected with the axle hand into the oil pit. The groove at the bottom of the ring is at



Application of No-Leak-O Pison Rings.

all times filled with oil making a perfect combustion tight seal at all times.

Further details may be had by applying to the Automobile Accessories Co., 824 W. North Ave., Baltimore, Md.

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Third Annual Convention.

The third annual convention of the National Association of Purchasing Agents will be held at Detroit, September 23, 24 and 25. The convention headquarters will be at the Hotel Pontchartrain.

While a suitable amount of entertainment and diversion are included in the arrangements, the gathering will be primarily a war convention. The topics assigned for discussion deal largely with the part which industrial purchasing agents may take in serving the interests of the country at this time.

Attendance at the convention is not limited to members of the association, an open invitation having been extended to purchasing agents in all industries and in all sections of the country. Representation from every state in the union is assured, and the gathering promises to be one of vital importance not only to purchasing agents but to all business organizations.

The headquarters of the association are at 25 Beaver Street, New York City, Secretary L. F. Boffey being in charge.

"We Are Having Excellent Success With the Sale of Dixon's Automobile Lubricants."

So write the Coeur d'Alene Hardware & Foundry Co., Wallace, Idaho, and it is with pleasure we reproduce below the balance of the letter.

April 17, 1918.

"We take pleasure in announcing that we are having excellent success with the sale of "Graphite Products" as manufactured by the Joseph Dixon Crucible Company, Jersey City, N. J., and especially the sale of Graphite Greases for Automobiles.

"Last year was the second year that we handled this commodity, and since our sales were four times what they were during the first year, and as we have sold as much this year already as we did during the entire year of 1917, we are thoroughly convinced that this product has an exceptional merit, for the reason that all of our preferred customers are specifying. the Dixon Greases and do not hesitate to advise us that it is the best product which they have ever used for this purpose."

That other dealers have had the same success is borne out by letters received from them and which will be published from time to time.

"We Are All Enlisted Men."

"We are all enlisted men, members of a single army, of many parts and many tasks, but commanded by a single obligation, our faces set toward a single object."

From the President's Labor Day Proclamation.

Not since the dawn of history, when tribe fought tribe, has a war so called on the entire forces, industrial, economic and spiritual, of a people. Co-ordination and co-operation to the utmost are needed if german menace is to be overcome.

Not merely every man of fighting age, but every man and woman and child has a place in this Drama of the Ages. Some of us bear arms; those of us who remain behind, and who are safe because they are on the battle line, owe them our duty of loyalty and service. Without these they cannot fight; without these there can be no victory of Right over Wrong. The vast supplies of the tools of war must be provided by us, by our labor and our money. "We are all enlisted men, commanded by a single obligation."

The Fourth Liberty Loan is here. It is a bugle call!

BUY LIBERTY BONDS!

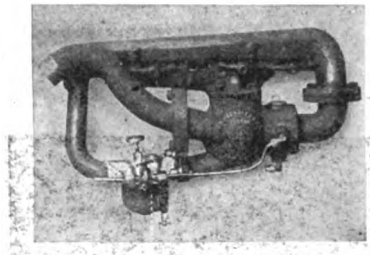
Olsen Vaporizer.

Every automobile owner realizes that at the present time he must save gasoline. This fuel is necessary for our aeroplanes and high-power engines used by our armies abroad.

At home, however, there is a substitute which is 50 per cent cheaper and equally powerful. We speak of kerosene. It is true that this fuel does not vaporize as readily as does gasoline. It is not always possible to start an automobile engine on kerosene unless it has been heated.

Kerosene is a cheaper fuel, which at the present time may be considered as a by-product of gasoline. There seems to be plenty of it and this fuel is used exclusively in England for driving automobiles.

To utilize kerosene or other heavy fuels, a special form of vaporizer is necessary



The Olsen Vaporizer Applied.

and such a vaporizer is manufactured by the United States Vaporizer Co., 213 State Street, Boston, Mass., and known as the Olsen Kerosene Vaporizer. At the present time this device is manufactured particularly for Ford cars. The manufacturers claim that when the Olsen vaporizer is used, the engine delivers as much power as though it were consuming gasoline.

They also claim that more mileage is obtained per gallon of fuel, that the flexibility of the engine is increased and that carbon, the one bugaboo of motorists, is not deposited upon the pistons or in the cylinders.

So great is the manufacturers' faith in the Olsen vaporizer that he is willing to send the vaporizer to any motorist for thirty days free upon receipt of the price. At the end of thirty days, if the owner does not feel that the vaporizer is giving satisfaction, he can return it and get his money back. An especially interesting proposition is offered to dealers. Kerosene is undoubtedly the fuel that will be used in the near future and dealers who enter the field at this time are bound to have many sales in kerosene vaporizers.

See-Safe Windshield Wiper.

No automobile driver likes to drive his car in the rain or fog, particularly if his car is equipped with a windshield, for the very reason that the moisture deposits upon the glass and renders it practically opaque.

Very frequently the motorist is obliged to drop his windshield and drive without it in order to see the road ahead, thus inconveniencing himself and the passengers with him. This procedure is entirely unnecessary if the motorist will equip his machine with a See-Safe windshield wiper, a device which clamps over the top of the windshield and wipes the glass for a distance of ten or twelve inches. The contact is made through a length of squeegee tubing.

As soon as moisture deposits upon the windshield the windshield wiper is moved across the shield. The squeegee tubing wipes off all of the moisture, leaving a clear opening through which the driver can see the road ahead. The inside of the device is fitted with a roller so that it may be moved with a minimum amount of effort. It is so arranged that it may be pivoted at the top or moved straight across the shield. Motorists interested in this device should write the Stadeker Metal Specialty Co., 358 West Madison Avenue, Chicago, Ill.

War Savings Stamps.

War Savings Stamps may not be considered especially as a thing new and interested in motordom, at the same time, however, there is a new and interesting idea which may be considered in connection with War Savings Stamps.

Many of the dry good stores as well as drug stores and other retail interests throughout the country make a practice of requesting their patrons to take a portion of their change in thrift stamps. Why would it not be a good idea to offer these stamps as a sort of a bonus given with certain accessories, while Thrift Stamps could be used with cheaper purchases?

Of course the patron could be charged slightly more for the article in question. At any rate the dealers throughout the country could make a practice of popularizing both War Savings and Thrift Stamps.

Geo. D. Bailey Co. Build New Factory.

A little over a year ago the George D. Bailey Co. was organized for the purpose of marketing the Bailey Ball Thrust bearing for Fords and Chevrolet 490 cars. This ball bearing was to replace the flat thrust washers that take the gear thrust at the left side of the differential and which, because of their flat surface, produce friction and wear thin, causing gears to unmesh.

The company, after having perfected their ball thrust bearing which, containing steel balls, was frictionless, and thereby permitted no wear, proceeded to market it through the regular dealer channels in a conservative manner, feeling that the market was present for such a bearing. A greater demand soon made itself evident and that there was a popular demand for a bearing of this type is evidenced by the fact that in just one year's time the Bailey Company has been forced to move from their previously small quarters and build their own modern factory.

The new plant, located at 4500-4506 Ravenswood avenue, Chicago, is equipped with $75,000 worth of the latest type of machinery for manufacturing not only the Bailey Ball Thrust, but their new product, the R C Magneto Coupling for trucks, tractors and passenger cars, and is so arranged as to enable the company to turn out its products economically on the highest efficiency basis as well as placing it in a position to manufacture other products the company has in mind.

Not a little of the success of the rapid growth of the Bailey Company can be attributed to Mr. C. F. Ferguson, vice-president and general manager, whose intimate knowledge of merchandising methods has enabled him to inaugurate as a selling policy for the Bailey Ball Thrust one that has proved to date a most satisfactory one to dealers throughout the United States and Canada. Judicious advertising also has played a large part in the success of this manufacturer.

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HELLO BILL! Shake!

Remember that tip you gave me in August about the

STOKES CARBURETOR

"Well, I thought it was pretty strong talk; but sent for six, and got jobber's proposition on my county anyway.

"Put one on my car, and *say!* I never was so surprised and enthused over any auto accessory in all my life!

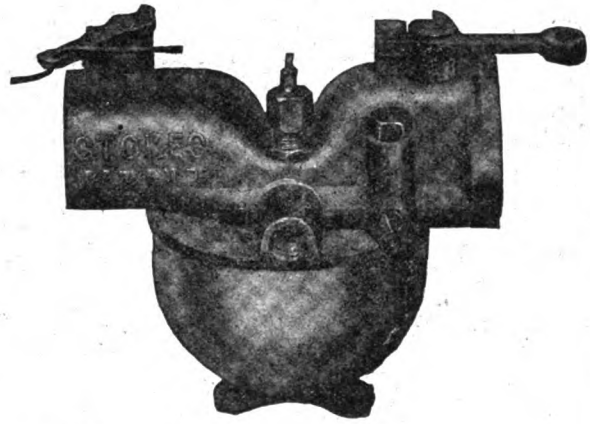
"Two of my good customers wanted to know what got into me. I told them to go drive my car around a while and up their pet hill and see for themselves. Same thing happened to them. All bubbling over with the same exclamations! 'Makes my car run as smooth, quiet and responsive as a steamer!' 'Certainly makes starting a real pleasure.' And, 'doesn't that quick get away' and that 'pep' and 'power' give you some satisfaction though.

"And they go on ma ve ing about its combined efficiency and simplicity, including the adjustment.

"And its economy feature paying a big dividend on their investment, etc.

"The first lot of six were sold within 3 days. And it's just as you say, Bill, it makes friends for you, who spontaneously talk, and boost, and unconsciously sell it for you.

"Shucks! I see space won't allow me to tell you now, but wait until next month and you hear all about my first experience in tackling the jobber's proposition. That's the real big reason why I am even more enthusiastic than you said I'd be. And I do want to thank you for the best tip ever given me. See you next month, Bill—so long."



Auto Repair Men and Garage Owners

Bill's and Joe's experiences are really true and typical of the average Repair man and Garage owner who u. dertakes our dealer's and jobber's propositions.

The Carburetor not only sells itself, giving you liberal commission, but it makes friends for you whose other repair work you get.

It increases the mileage per gallon of gas over other carburetors on the average fully 35%.

And it is making the guaranteeing of a 25% increase over other carburetors really a safe proposition for the company.

It so markedly surpasses all other makes on the 5 vital points:—Easy Starting; Flexibility; Power; Simplicity; Economy—that it is becoming known everywhere, as "THE LEADING CARBURETOR."

Has no moving parts to give trouble from wear or coagulation.

Put on for a 15 days' trial, it never fails to add a new booster to its rapidly growing list.

The price is $15.00. If a purchaser is not entirely satisfied after 15 days' trial the purchase price will be refunded.

Write for full particulars today. Mail coupon herewith attached and we will give the order our prompt attention.

The Stokes Carburetor Co., Inc.

781 East 142nd Street, New York City

(Kindly attach this coupon to your Repair Shop or Garage order head)

STOKES CARBURETOR CO., INC.

COUPON

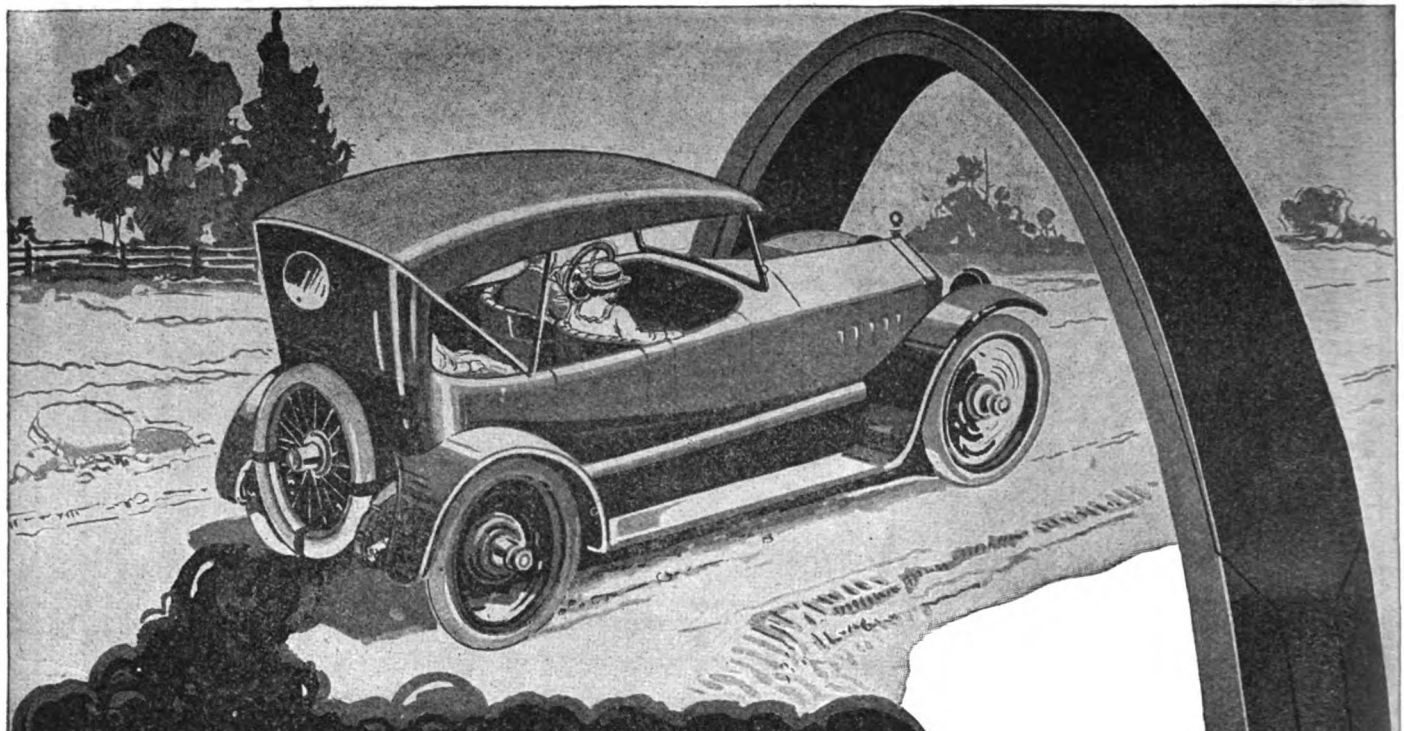
Please send me one carburetor C. O. D., with full directions for trial. Price $15.00 —less dealers' discount. It is understood that if within 15 days I find it not satisfactory and as represented that I can return it and you will refund my money.

NAME.....

ADDRESS.....

Please Mention the Automobile Dealer and Repairer when writing to advertisers.

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A SURE SIGN of carbon is a smoky exhaust, due to lubrication getting *past* the piston rings up into the combustion chambers where it *burns*. Leaky piston rings waste as high as 25% gasoline —one drop in four.

HI-COMP PISTON RING

"THE RING THAT MAKES THE MOTOR SING"

are the best gas-tight rings for overcoming engine troubles due to carbon—knocking, skipping, faulty ignition; valve pitting, wearing down of cylinder walls, piston and piston rings; smoky exhausts.

Hi-Comp Piston Rings are made from two perfectly balanced perfect eccentric rings into one absolutely gas-tight concentric ring. Each ring ground under oil — not buffetted — to preserve the true temper of the secret process gray iron and ensure high polish and gas-tight fit. Won't wear cylinders out of round — *proof* of gas-tightness. Make reboring of average cylinders unnecessary — an exclusive Hi-Comp advantage. Hi-Comp Piston Rings deliver every ounce of power from every drop of gasoline on to the piston head — no power or oil can get past them!

It will pay you to install Hi-Comp because of the satisfaction they give to you and your customers. Fully guaranteed by an old established piston ring company to give MORE POWER on less gasoline and oil. Write for booklet, specification chart and details of 90-day trial guarantee

The Continental Piston Ring Co., Memphis, Tenn.

The Ring that Makes the Motor Sing

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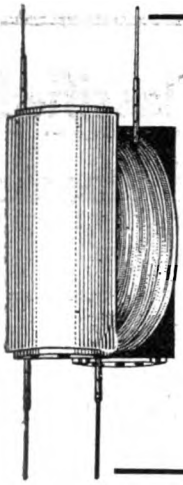
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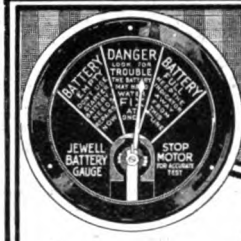
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A Real Necessity to Avoid Battery Trouble.

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CORED BARS

The Standard

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STOCK SIZES

Piece No.	Outside Diameter	Inside Diameter	Length	Approx. Weight
A	1	½	12	2
B	1¼	½	12	3½
C	1½	¾	12	5
D	1¾	¾	12	7
E	2	1	12	8½
F	2¼	1¼	12	10
G	2½	1½	12	11½
H	2¾	1¾	12	12¾
I	3	2	12	13¾
J	3¼	2¼	12	15½
K	3½	2½	12	17
L	4	3	12	21
M	4¼	3¼	12	20

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Walden Worcester, Inc. 30

Triple-Heating the Gas.

Getting every ounce of energy out of the fuel is the aim of every truck engineer, driver and operator in these days, when ounces count. Various devices have been tried for reducing fuel consumption and eliminating waste, and one inventor has gone so far as to compound a chemical which he claims will increase fuel mileage when added to the gasoline in the tank. Few of these devices, however, have met with as great success as the motors which superheat their gas before it passes into the combustion chamber.

On the Fulton Motor Truck, the gas is heated three times before it reaches the intake valve. In the first place, the air is heated by passing through a stove before it enters the carburetor. This stove is kept hot by the exhaust pipe to which it is attached. The air, thus heated, passes into the carburetor and serves further to vaporize the globules of gasoline which have been broken up in the spray.

This gas mixture is then conducted through a cylinder block channel between the hot cylinders to the opposite side of the motor. In this second heating the gasoline is still further vaporized. Any particles of fuel that may yet remain unmixed with the air are dashed against the hot spot of an exhaust contact manifold, and thus vaporized in a third heating. When the gas goes into the cylinder it is a thorough and highly combustible mixture.

The result is power and the greatest possible efficiency in the consumption of fuel. There is no waste gasoline and particles of kerosene or other low grades of fuel are not deposited in the cylinder. Careful tests show that the Fulton with a 1½-ton load will consistently give twelve to fourteen miles on a gallon of gasoline.

William Fulton Melhuish, president of the Fulton organization, has long been known in the manufacture and operation of motor trucks for his conservatism and strict adherence to usual time-tested practice and it was only after years of road demonstration that he would permit the Fulton engineers to standardize on this "triple-heated" gas feature which has proved so uniformly successful in Fulton operating economy.

Woodworth Lubricating Spring Cover.

The Woodworth Lubricating Spring Cover is a leather covering for automobile springs which completely encloses them. It has a lining of felt wicking which is saturated with oil before the covers are put on and will retain oil enough to lubricate the springs for a year or more. The Covers are made for all cars and can be easily fitted even by an inexperienced person.

These Covers not only provide perfect lubrication for the springs but they keep out all moisture and dirt and keep in the oil so that the outside does not become greasy and messy.

Proper lubrication of the springs makes the car ride easy, eliminates squeaks, prevents broken leaves and makes the springs so sensitive that they absorb shocks and vibrations, relieving the tires and machinery of a great deal of strain, greatly prolonging their life.

The Woodworth Lubricating Spring Cover is held on the springs by small straps which buckle underneath, thus there is no strain on the outer covering and consequently the covers last almost indefinitely.

A circular giving full information regarding the covers will be sent free to anyone writing to the manufacturers, the Woodworth Manufacturing Corporation, Niagara Falls, N. Y.

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Double Tread Tires

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30x3½ tire..... 6.50
34x4 tire..... 9.50

For Non-Skid, 10 Per Cent Extra

All other sizes on request. 20% deposit required on C. O. D. orders.

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Save 50% on your tire bills.
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30x3	5.50	6.00	36x4	10.00	11.00
30x3½	6.50	7.75	34x4½	11.00	12.00
32x3½	8.00	9.00	35x4½	11.00	12.00
31x4	9.00	10.00	36x4½	11.00	12.00
32x4	9.00	10.00	37x4½	11.00	12.00
33x4	9.00	10.00	35x5	11.00	12.00
34x4	10.00	11.00	36x5	12.00	13.00
			37x5	12.00	13.00

Have your own tires Double Treaded by the same process. Our charges are only 40% off the above mentioned prices.

Send your order to our nearest office.

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Double Tread Tires

Notice Our Prices Before Going Elsewhere

PRICE LIST

Size	Plain	Size	Plain
30x3	$5.00	35x4	$9.00
30x3½	5.50	36x4	9.50
32x3½	6.50	36x4½	10.00
32x4	7.00	36x5	10.00
33x4	7.50	37x4½	10.00
34x4	8.00	37x5	10.50
34x4½	8.50		

For Non-Skid, 50 cents more on all sizes.

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INSYDE TYRES,
inner armor for automobile tires. Double mileage. Prevent punctures and blowouts. Details free. Agents wanted. Big profits.
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Dept. AD3, Cincinnati, Ohio

Tires

BUY EARLY AND SAVE MONEY

Double Tread Tires and Tubes

GUARANTEED

Come to the Tire Clearing House—here are prices—clear cut and plain as daylight. We buy wholesale the best "try out" Tires—and you get the benefit—you want truthful tires, and truth is never crushed to earth if given a square deal—real truth is puncture proof—

SO ARE OUR TIRES.

Size	Plain	Non-Skid	Tubes
28x3	$4.40	$4.95	$2.00
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32x3½	7.15	7.70	2.75
34x3½	8.25	8 80	3.00
30x4	7.70	8.25	2.75
32x4	8.80	9.35	3.00
33x4	8.80	9.90	3.50
34x4	8.80	9.90	3 50
35x4	9.90	11.00	3.60

Get your order in quick for goods listed here—by all means get in touch with us for further information about our special process—it means money in your pocket. Get in right—write today—yes—today.

Look up rating in Dunn's or Bradstreet's.

Size	Plain	Non-Skid	Tubes
36x4	$9.90	$11.00	$3.60
32x4½	9.90	11.00	3.75
34x4½	11.00	12.10	4.00
35x4½	11.00	12.10	4.10
36x4½	11.00	12.10	4.25
37x4½	12.10	13.20	4.35
34x5	11.00	12.10	4.50
35x5	13.20	14.30	5.00
36x5	13.20	14.30	5.00
37x5	13.75	14.85	5.00

For (non-skid) sizes up to 32x4, 50c extra; all other sizes $1.00 extra.
For rebuilding your old tires we charge you 60% of the above prices.

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THE HOME OF DOUBLE TREAD TIRES

PRICE WRECKERS

Double Tread Tires with Double Lock Stitch

30x3	N. S.	$5.50	34x4½	N. S.	$8.50
30x3½	"	6.50	35x4	"	9.00
32x3½	"	7.00	36x4	"	9.50
31x4	"	7.25	36x4½	"	10.00
32x4	"	7.25	36x5	"	10.00
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rear axle bevel gears and pinions

These are all new parts.

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Dealers in Magnetos of all Makes. Lighting Systems and Self Starters.

Expert Repairing of All Makes.

Express your Magneto, Starter and Generator to us. Same will be repaired and returned same day as received.

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FOR—SALE—Northway Trailer Cars. Have several ¾ and 1-ton 4-wheel type. Will sell very cheap. New in crates. The Brown Co., 213 Bellevue ave., Syracuse, N. Y.

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ALL STANDARD MAKES at

Last Spring's Discount

Write for Stock Sheets and Prices

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IGNITION, STARTING-LIGHTING

Genuine Parts only used in repairs.

K-W Magnetos -:- Zenth Carburetors

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Few Specials

100 lb. Assortments Bolts, Set Screws, Washers, Machine Screws, Etc., @ - - $5.50

Armstrong cork packing, 1/16 in. sheets 12x36 - - - - - $4.80 Doz.

2000 3 7/8x5/32 Dia. Cut, piston rings - 10¢

2500 3 1/2x3/16 - - - - - - 15¢

70 sizes piston rings in stock, lowest prices

Primary cable - - - $1.83 per 100 ft.

Secondary " - - - 3.40 " "

7MM Rubber covered cable 3.00 " "

No. 12 and 15 Firestone Horn bulbs .48 each

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2 or 3 screw cutting lathes suitable for repair work in garages.

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RECTIFIERS to charge from A-C circuit 1 to 8 ignition lighting or starting batteries at one time, $12.00 upward. American Battery Co., 1136 Fulton St., Chicago, Ill.

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CYLINDER GRINDING PISTONS — AND — RINGS

Largest Because Best.

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WE REPAIR Lamps, Radiators, Windshields and Fenders, of every description. Largest repair plant in New York. Great accessory bargains on hand for immediate delivery.

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Those Requiring the Very Best in

CYLINDER GRINDING

fitting with light grey iron pistons, leakless rings, hardened and ground pins, our work has no comparison with the ordinary, now obsolete heavy type pistons and rough boring jobs. We grind our cylinders to one-half thousandths, mirror finish. We grind our pistons on the highest grade machines to fit, two and one-half thousandths clearance. We use the McCadden leakless piston rings. Work all reassembled ready for installation. All work positively guaranteed.

Patterns and castings in stock for every make of motor.

McCADDEN MACHINE WORKS, Inc.

St. Cloud, Minnesota

Keep the "Old Boat" in Service!

HAVE US

REGRIND the CYLINDERS

AND FIT

BUTLER LIGHT WEIGHT PISTONS

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Workmanship and Material Guaranteed

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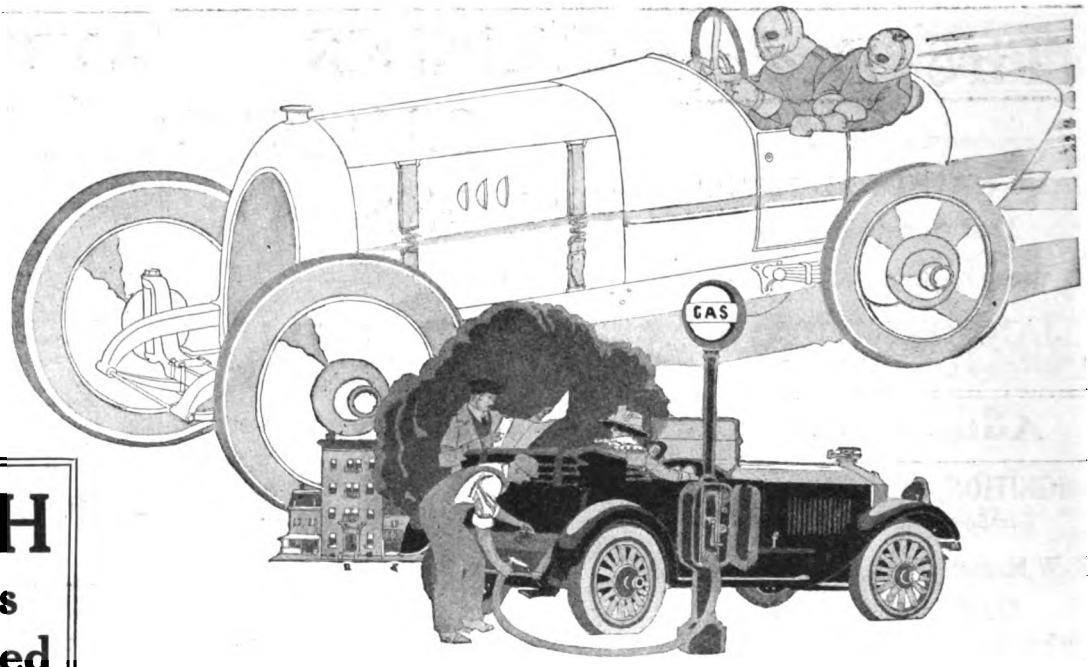
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The Cell Beam Lamp.

The Cell Beam Manufacturing Co., 1101 Bedford Avenue, Brooklyn, New York, announce that they have changed their policy and now sell from factory to jobber. They have also made a number of improvements in their Cell Beam lamp. Generally speaking, the cell beam is at present more substantially constructed and less liable to damage than formerly. The body of the lamp has been strengthened, the focus adjustment has been improved and the handle fully nickel plated instead of polished as formerly.

This lamp is provided with a thick front lens and eight feet of cord instead of five feet as before. One of the greatest improvements is an etched frosting on the 30 c.p. nitrogen bulb, instead of a coating as formerly. Jobbers are requested to write the factory for full details and special proposition.

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RAJAH

Shipments Are Delayed

Shipments of Rajah Plugs are considerably delayed owing to heavy government requirements placed with the Rajah factory.

In some sections of the country Rajah Plugs are almost unobtainable. *Don't let this happen to you.*

We strongly urge you to place your orders now, anticipating your requirements as far ahead as possible to insure your having stock on hand.

Rajah Terminals and Adapters

are furnished so that Rajah Plugs can be used with any car.



Rajah Regular and Ferrule Clip Terminals

Adjustable to any cable and with ferrule to fit any cable. With the extra collar supplied both can be used with any make of plug.



Rajah Thumb Nut and Stud Terminals

The Thumb nut is an adapter for Dodge, Ford, Hup, Hudson, Maxwell, Mitchell, Packard Twin Six and Pullman. The Stud for Buick, Chevrolet and Oldsmobile.



Rajah Ball Terminal

Adapter for Franklin, Locomobile and Willys-Knight.

Manufactured by

Rajah Auto-Supply Co.

Bloomfield, N. J.

Sales Department

Edward A. Cassidy Co., Inc.

280 Madison Ave., New York

The Government asks car owners to save gasoline

The car owner knows that a leak in his ignition is as wasteful as a leak in his gasoline tank.

Sell the Rajah—the plug that conserves gas. Its quick, hot, brilliant spark unfailingly ignites every atom of the mixture. Its gas-tight construction and special heat-resisting porcelain permit no power leakage. Every ounce of energy is delivered behind the pistons.

In racing cars, airplanes and speed boats, where the gas engine is put to its severest test, Rajah Plugs are daily demonstrating this exceptional service.

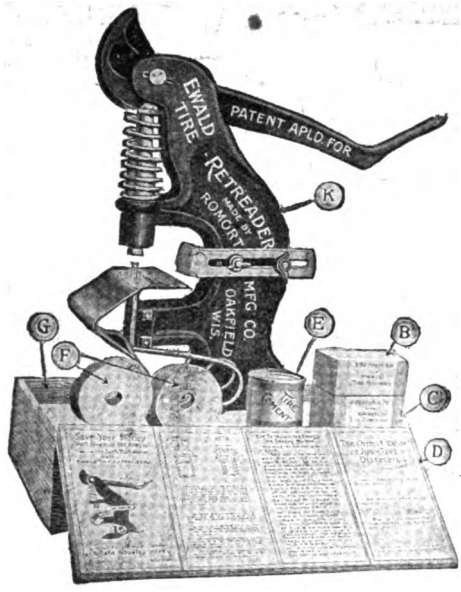


Note: To give your customers 100 per cent efficiency see that they install a complete set of Rajahs.

Rajah Terminals are furnished so that Rajah Plugs can be used on any make of car.

RAJAH SPARK PLUGS

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Tire Retreader Outfit

A.—RETREADING MACHINE
B.—250 SPECIAL STAPLES, ½-IN. LONG
C.—250 SPECIAL STAPLES, ⅝-IN. LONG
D.—FULL SHEET OF DIRECTIONS
E.—1 CAN TIRE CEMENT
F.—2 ROLLS RUBBER RELINER
G.—1 SHIPPING BOX

One Repair Man Writes:

"IT PAID FOR ITSELF THE FIRST DAY"

It is easy to staple 10 tires a day with the Ewald Tire Retreader at $2.50 per tire.

How would you like to make $25.00 and over per day or $650.00 per month?

Here is a chance for the Tire Repair Man to coin some money.

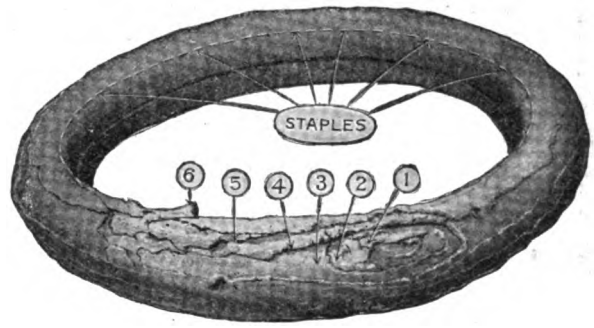
Auto drivers will have to have their tires repaired because the Government is taking 70% of all the rubber. It is up to the Repair Man to help save all the tires he can.

Save Your Money

Don't Give Your Old Tires to the Junk Man

INSTALL AN

TRADE MARK Ewald Tire Retreader



The above tires were stapled by the Ewald Tire Retreader and then run over two thousand miles. You can see the fabric at 1, 2, 3, 4, 5 and 6 as it wore away, but not a single staple pulled out.

For Sale By Dealers and Jobbers Everywhere

Hundreds in Daily Use, and Thousands of Tires Are Saved by the TRADE MARK Ewald Process

Every Tire Repair Shop Needs One

Factory Sales Department
THE ZINKE COMPANY
Chicago, U. S. A.

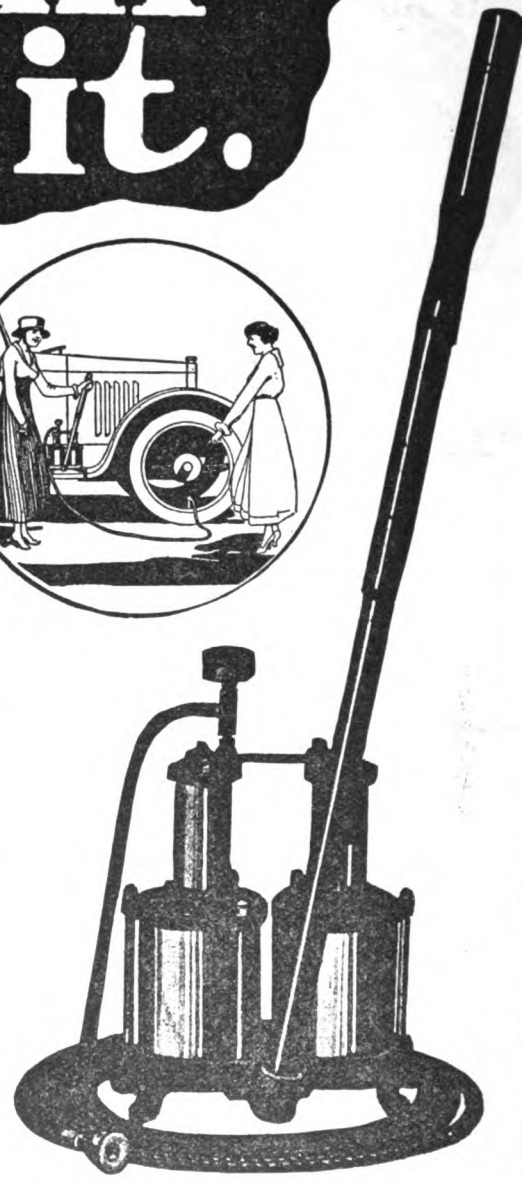
Manufacturers
ROMORT MFG. COMPANY
Oakfield, Wis.—Chicago, Ill.

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At Our Risk- You Can Prove it.

DON'T waste good money on tire pumps that either break your back, or pump **Rubber Rotting** oil particles or gasoline fumes into your tires.





TAKE NO CHANCES

At our risk you can prove that the **"Dead Easy"** is quicker, safer, easier and cheaper than any other tire pump, either engine drive or hand power.

Convenient to carry with any car, it is always ready for instant service. The gauge showing exact tire pressure, there is no guesswork—and it's **"Dead Easy."**

FREE TRIAL OFFER

Write Today, NOW, for Fifteen-Day—No-Money-in-Advance—Free Trial Offer

GLOBE MANUFACTURING COMPANY

Battle Creek, Michigan, U. S. A.

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DETROIT DETACHABLE WEATHERPROOF TOP

Is Absolutely Rattle-Proof and Will Last as Long as the Car

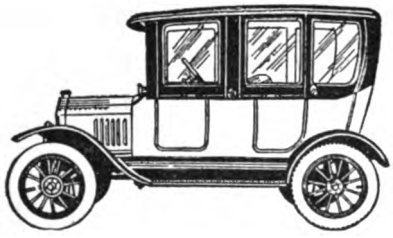
It is the only patented all-weather top that does away with the objectionable features of a detachable top and affords the car owner an enclosed or open body for year-round use at a really low price.

Just as the convertible sedan is now used twelve months in the year, so the Detroit Weatherproof Sedan Top is used in the warm as well as in the cold months.

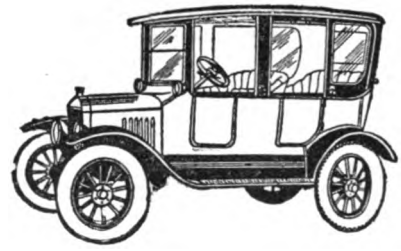
A Detroit Weatherproof Top is cool in Summer—warm in Winter. Windows in doors are made of a transparent, flexible material, slip up into the deck, leaving the car entirely open when desired.

In case of wind, rain or storms, the windows can be tightly closed, just as quickly and easily as you pull down the curtains in your home.

Storm Tight—Wind Proof—Dust Repellent



A SPLENDID OPPORTUNITY FOR DEALERS



Thousands of passenger car owners buy Detroit Weatherproof Sedan Tops. Do you realize the tremendous advantage held by the motor car dealer who sells Detroit Weatherproof Tops, with all these live-wire motor car prospects, who may want a new car next year, or right now, coming to his salesroom floor to buy Sedan Tops? What a list of ripe motor car prospects a Detroit Weatherproof Top dealer can obtain in this way.

And every prospect made a personal friend through the sale of a Detroit Weatherproof Top,—nearly every such prospect a probable purchaser of a motor car this year or next!

Contracts Are Being Signed for Another Season

Detroit Weatherproof Dealers are so satisfied with the ease with which these sedan tops sell, that they seldom allow any condition to arise which will interrupt the continuation of their prosperous relationship with the Detroit Weatherproof Body Company.

Still, changes occur here as they do in every business and there are also localities in which the rapid growth of our business generally has kept us from securing representation.

Perhaps the Detroit Weatherproof Top is still unrepresented in your section, or perhaps you think you can improve our representation in your territory.

In any case, we will be glad to hear from you.

DETROIT WEATHERPROOF BODY COMPANY

Saginaw Street, Pontiac, Michigan

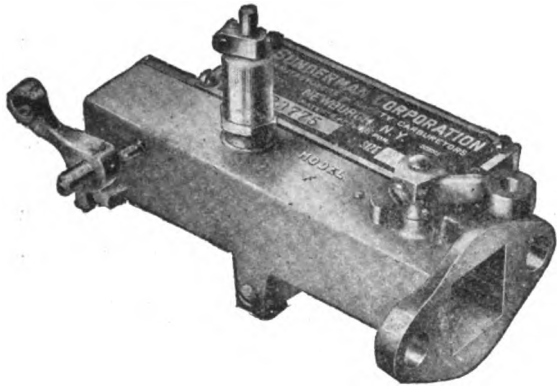
SHARRER PATENT TOP CO., Tel., Circle 1636, 2 doors West of Broadway, 239 WEST 56th ST., NEW YORK CITY

Wholesale and Retail Distributors in Eastern New York, Connecticut and Northern New Jersey for Detroit Weatherproof Body Company's All-Season Demountable Tops.

Especially constructed for: Hudson - Chalmers—Chandler—Buick - Overland - Maxwell—Chevrolet—Ford—Ford Roadster

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SUNDERMAN
Vacuum Carburetor



Model F **$6**

For Ford, Metz and Saxon Four

F. O. B. Newburgh, N. Y.

Model BB—for all other cars—without connection **$8**

With regular connection **$10**

With Special connection **$12**

Let This Carburetor Pay Your War Taxes

You Will Serve the Government at the Same Time

THE Sunderman Carburetor saves from 30 to 50% of gasoline on any car. If the Government taxes gasoline at 2 cents per gallon, that will equal about 8%. Our carburetor saves 30% at the minimum.

Figure it out: If you use 10 gallons on a trip now, with a Sunderman carburetor you will use no more than 7. Ten gallons at 25 cents, plus 2 cents war tax, cost $2.70. Seven gallons at the same price and tax cost $1.89—*a clear saving on one trip of 81 cents*—as a minimum—and you have rendered the Government double service—you have paid your tax and saved gasoline. You may buy War Savings Stamps with the money you save.

If the Government taxes you on the basis of the price of your car, the savings in gasoline cost made by a Sunderman Carburetor will pay the tax for you and leave a substantial remainder. And still you'll be serving the country—you can "carry on," do your duty and preserve your personal efficiency through recreation and the proper use of your car for business or semi-business purposes.

Your Paramount Duty Today

Whether you are a manufacturer, a jobber, a dealer, a garage or repair man, or an owner of a motor truck, your duty to your Government and the industry that supports you is plain:

You must co-operate with every measure decided upon to help along the efficient conduct of the war.

You must conserve the use of *fuel* and raw materials.

You must do business up to the patriotic maximum—for in that way only can you serve your country best.

You must devise ways and means to *save* and to *serve* so that the great automobile industry shall not only *live*—it must *thrive*. Whether the men at Washington fully appreciate it or not, the automotive industry's development in America is the *chief*—we had almost said the *only*—factor that will make possible the certain victory to which America's millions have pledged themselves.

Your Course Is Plain

No matter what branch of the business claims your interest, you must begin to *serve through saving*

Any plan or instrument that saves you or your customers money enables you to take care of new tax demands and still leaves you free to serve further.

We offer the Sunderman Carburetor on this basis. *Our business has increased remarkably this year for just this reason.*

It saves from 30 to 50% of gasoline—thousands of car owners are proving that statement. Many do even better. At the same time it gives *more power*, greater flexibility, faster pick-up, quicker getaway, better hill-climbing, more economical idling and helps to prevent carbon.

Your opportunity is plain—Order a Sunderman Carburetor at once

Dealers—Can't you see the handwriting on the wall? Write for our proposition at once.

Sunderman Corporation, 13 Chambers St., Newburgh, N. Y.

PACIFIC COAST BRANCH: 593 MARKET ST., SAN FRANCISCO, CAL.

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HUDSON

Crank Case Repair Arm

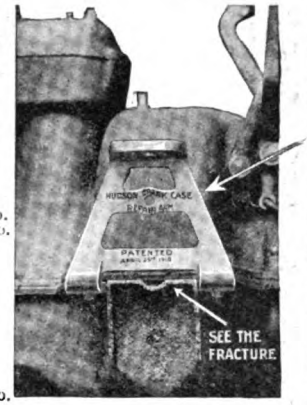
PRICE F. O. B. PHILADELPHIA, $1.50



A Wrench and 15 Minutes Does the Work

In Stock with Jobbers and Dealers in United States and Canada

If your iobber's name is not here, tell us. We will wake him up—or try to



ALA.—Montgomery
Loeb Hardware Company
ARKANSAS—Little Rock
Arkansas Auto Appliance Co.
CAL.—Los Angeles
E. A. Featherstone
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W. E. & W. H. Jackson
McCoy Motor Supply Co.
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Henry W. Peabody & Co., New York City, S. Africa
Weinstock Nichols Co., Los Angeles, Cal.

HUDSON MOTOR SPECIALTIES CO., 1932 Arch St., PHILADELPHIA, PA.

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There is one army more powerful than all the cannon on earth! It is behind the counters of the retail stores of this country.

Are you in command of part of it, you owner, manager or director of a retail business? You certainly are and you must launch it against the Powers of Evil now intent upon the destruction of everything worth your while as a business man.

SELL WAR SAVINGS STAMPS

Money will win this war and nothing else will. Valor without equipment is of no avail. Strategy without strength is of no avail. Money loaned our Government will assure them all for our armies — ships, guns, munitions, food, clothing, medicine, hospitals.

Give the order. Your salespeople will do the rest. They are fighters every one. They couldn't be soldiers in the greatest army in the world if they were not—the army of retail salespeople.

W.S.S.
WAR SAVINGS STAMPS
ISSUED BY THE
UNITED STATES
GOVERNMENT

PIONEER DIVISION
National War Savings Committee
51 Chambers Street, New York

Space Donated By
MOTOR VEHICLE PUBLISHING CO.
Publishers of the Automobile Dealer and Repairer

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Use the old car another year.
Just a little time applying

"F-S" "Evernew" Auto-Body Enamel

makes her look "almost as good as new."
It is easily applied, dries quickly, hard and durable. Does not show brush marks. Eight standard colors—special shades to order.

Send for color card

FELTON SIBLEY & CO., Inc.
Mfrs. of Colors, Paints, Varnishes since 1863
136-140 North Fourth Street Philadelphia

"Economic efficiency is necessary to Win the War."

"Evernew" Auto-Top Dressing revives and waterproofs old tops yet leaves them pliable.
(18-1)



Neat Appearance
Economy
Quality

The ALLEN TIRE CASE



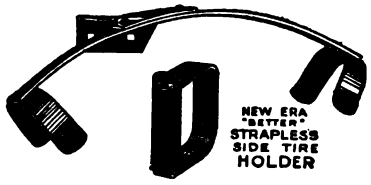
Handsome design, plus complete protection from rain, sun, oil.

Made in all colors and color combinations. All sizes. Various styles to meet various requirements.

The Allen Auto Specialty Co.
16 West 61st St., New York
2007 Michigan Ave., Chicago

NEW ERA "BETTER" STRAPLESS SIDE TIRE HOLDER

Made of steel, has no cast parts to break and no straps to wear out or be lost. The locking device is a part of the tire holder. Tire easily slips into place and is quickly adjusted. A convenient, light tire carrier that has many exclusive advantages. Self-expanding carrying rim can be furnished where demountable rims are not used.



Ask your dealer for New Era "Better" Strapless Side Tire Holders. Prices $2 to $3.

NEW ERA SPRING & SPECIALTY CO., 1171 Hamilton Ave., Grand Rapids, Mich.

The Quickest Tire Change on Earth



MINUTE WHEEL DEMOUNTABLE H-S

Made for Ford Cars by HILL-SMITH METAL GOODS CO., Boston
Backed by H-S Trade Mark of Quality

STOP 255 IL 17

"Put the Blame on the Man Behind"

Comer Auto Stop Signal

An *automatic* safety device that operates off the brake rod. If your Dealer does not handle, send in his name or order direct

Dealers, write for special proposition.

The Wonder Sales Co.
616-617 Hippodrome Building
CLEVELAND OHIO



255 IL 17

Made from Oil-Tempered Spring Steel Wire



They Remove Carbon Where Others Will Not

PATENTED MARCH 28, 1916



Cut out experimenting—get down to business. Why not own a set of FLEXIBLE CARBON SCRAPERS? They are the only scraper on the market that will do a satisfactory job without taking the motor to pieces. Compounds are dangerous. All good mechanics advise scraping carbon. Over 100,000 sets now in use by Auto Mechanics.

Price Per set, $1.50. Ask Your Dealer or Write

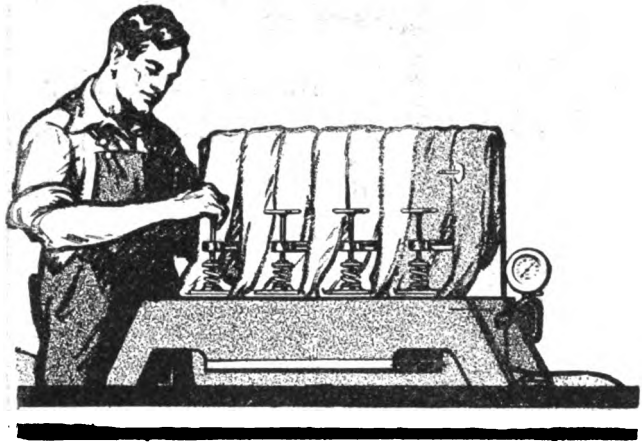
Flexible Carbon Scraper Co. 1421 W. Washington St. Los Angeles, California

Send for free sample of The Automobile Dealer and Repairer.
MOTOR VEHICLE PUBLISHING CO.
71-73 Murray Street, New York

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The Clark Electric-Steam Vulcanizer is Built for the Garage Man Who Wants Tire and Tube Repair Profits.

This outfit puts you in the vulcanizing business immediately—at lowest cost. No boiler to fire—no danger—simply hitch to your electric light socket. No current used when not working. Can be placed anywhere.



Absolute pressure control – cannot overcure. Handles all ordinary repairs to tubes and tires. Requires no watching. Endorsed by 17 leading tire manufacturers.

Vulcanizing work costs nothing to get. It pays big profits. The rising cost and scarcity of tires and the elimination of sizes has trebled the repair business.

Don't delay. Get the facts. The low price and big range of work of the Clark Vulcanizer will astonish you. Write at once—let us tell you how to get a machine quickly and make Vulcanizing the most profitable part of your business. Act now.

THE CONSOLIDATED PRODUCTS CO.
1838 Central Avenue
Cleveland

D & B Carburetor



Price with Auxiliary Air Control $10.00

Puts POWER and PEP in a FORD Motor.

Put one on yours and watch it Get Away and Keep on Going.

Simple, Springless, Efficient and Economical.

Measures the gasoline and air with the accuracy of a chemist's scale, without depending upon springs or other weak construction.

The metal float insures a constant gasoline level, unattainable in any carburetor dependent upon cork or floats of similiar construction.

A profitable proposition for all live dealers.

Write us or our distributors for details and prices.

Manufactured by

O. C. HARRINGTON CO.,
343 N. Crawford Avenue, Chicago, Ill.

Mid-West Distributors:
GRAY HEATH CO., 1440 Michigan Ave., Chicago, Ill.

New England Distributors:
The POST & LESTER CO., 112 Allyn St., Hartford, Conn.

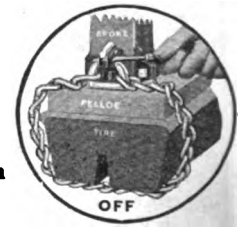
ARROW GRIP

NON-SKID CHAINS FOR SOLID TIRE VEHICLES



Simplicity
Safety
Salability

Easy to attach and detach



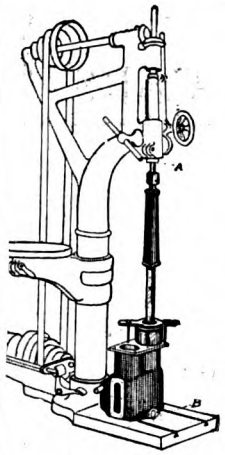
A size to fit every spoke—round or square

ARROW GRIP MFG. CO., Dept. I., Glens Falls, N. Y.

Special Request

¶ IN writing to advertisers for circulars or information, you are earnestly requested to mention in each case that the advertisement was seen in the "Automobile Dealer and Repairer." By so doing you will confer a favor on both publisher and advertiser

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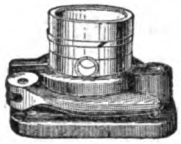


STORM
CYLINDER REBORING MACHINES

Are Making Big Profits for Thousands of Repair Shops

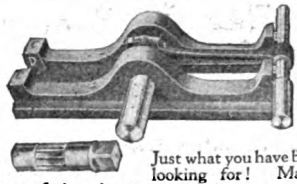
They are *Simple, Speedy, Accurate* and *Reliable* for hand or power. Adjustable for different sizes and are made in varied capacities to suit your requirements.
Also special Machines for Ford and Dodge.
No shop complete without one.
In daily use in United States and foreign countries.

The Storm Piston Vise



Holds the Pistons firmly while repairing or replacing bushings, pins, rings and rod. Saves time and prevents damage.

The Storm Connecting Rod Bearing Reamer, Jig and Straightening Gauge



Just what you have been looking for! Makes accurate fitting bearings and insures perfect alignment. With it, your cheapest man can do expert bearing work.

We also manufacture the **Storm Valve Tool, Special Pistons, Etc.**
For Sale by Leading Jobbers. Write for Catalog.

STORM MFG. CO.

Dept. A-26 **THOMPSON, IOWA**

TODAY'S "CHORE"
An American general electrified Europe with the remark:
"We'll just send enough men over here to finish up this chore."

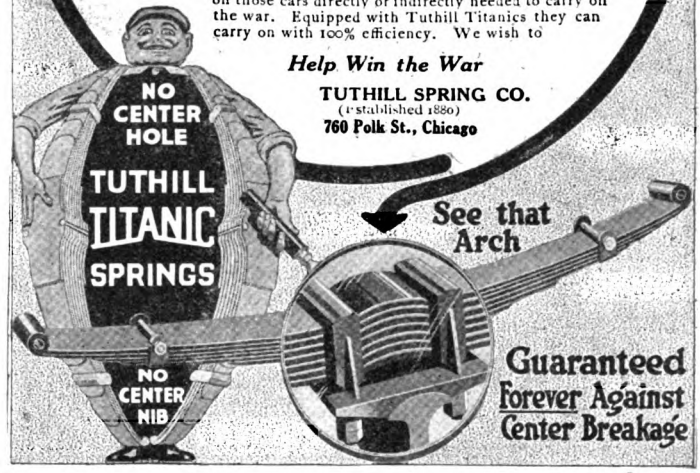
GUARANTEED
TUTHILL TITANIC SPRINGS
LUBRICATED

"Titanic" only Registered Trade Mark

are made to last—they do their bit in the big "chore" by guaranteeing protection to the owner. Spring replacements should only be made on those cars directly or indirectly needed to carry on the war. Equipped with Tuthill Titanics they can carry on with 100% efficiency. We wish to

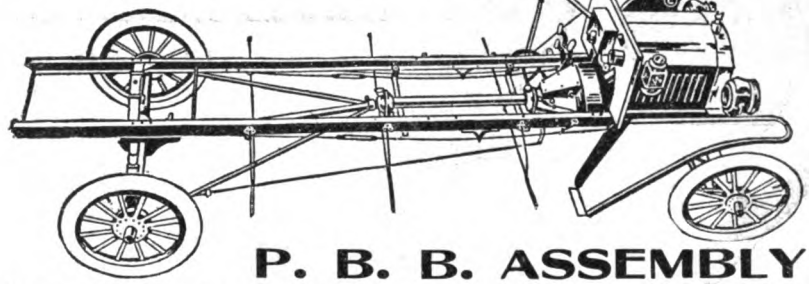
Help Win the War

TUTHILL SPRING CO.
(Established 1880)
760 Polk St., Chicago



HERE IT IS!





P. B. B. ASSEMBLY

Any new or used Ford can be made into a 1500 lb. Delivery Car without delay or annoyance. Don't keep yourself wondering or guessing about this wonderful outfit for lengthening a Ford Chassis—sit right down now and write to us—find out at first hand just what a real honest square deal proposition we've got for live men—do it! Write to us today. 1500 lbs. capacity.
124-inch wheelbase. — 130-inch wheelbase. — 136-inch wheelbase.

Our agent's proposition is bound to be of interest if we can get you to tell us who you are and where you are, so that we can explain things. Write today.

OTHER PRODUCTS—Beach Automatic Grip Pull; Beach Rim Tool; Grebford—Extension Unit; Greblox—Solder Cement.

GREB PRODUCTS

THE GREB COMPANY, 197 State Street, Boston, Mass.



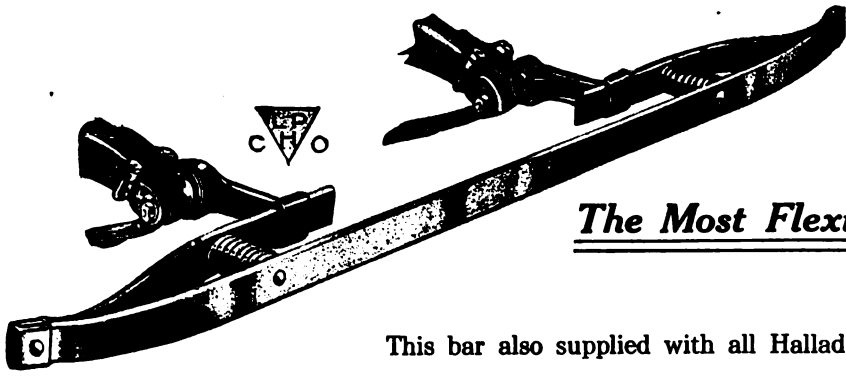
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FRONT and REAR BUMPERS FOR ALL CARS

End Thrust Multiple Spring Bar Bumper



Insures the utmost protection to the frame from head-on collisions or "side swipes"

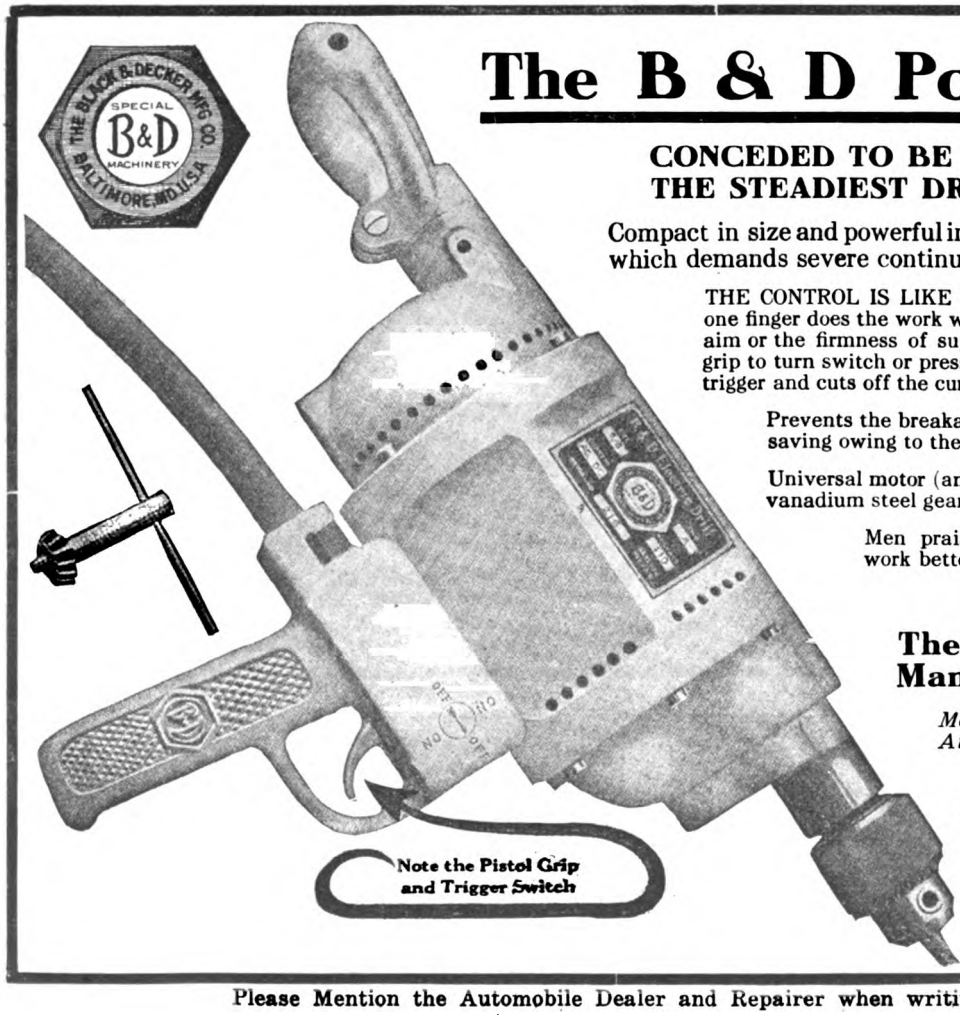
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This bar also supplied with all Halladay frame fittings for front and rear

L. P. HALLADAY CO.

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**CONCEDED TO BE THE SAFEST—
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Compact in size and powerful in construction—Stands up to work which demands severe continuous service.

THE CONTROL IS LIKE THAT OF AN AUTOMATIC PISTOL—one finger does the work without affecting the steadiness of the aim or the firmness of support of the tool. No taking hand off grip to turn switch or press button. Your finger merely pulls the trigger and cuts off the current.

Prevents the breakage of drills which now means a genuine saving owing to the uncertainty of deliveries.

Universal motor (any current), ball thrust bearings, chrome vanadium steel gears, forced draft cooling system.

Men praise the B & D Portable because they work better with it. Fully Guaranteed.

Write for full description.

The BLACK & DECKER Manufacturing Company,

Makers of Lectroflater Electric Air Compressors,

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HONEYCOMB RADIATORS



For Ford Pleasure and Commercial Cars, the Ford dealer is now assured of a high-class radiator, carefully constructed, that will render service efficiently and greatly improve the operation of the motor.

"Superford" Radiator Units are made entirely of brass

Model No. 16-F
For 1909 to 1916 Ford Cars. Made like the 1918 in two units with black detachable casing.
Price each, $30.00

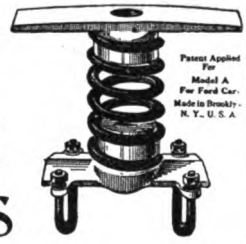
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For 1917-1918 Ford Cars, made in two units, with black detachable casing.
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Mr. Ford-owner! Attention!

USE THIS → AND PREVENT THIS





FOR - - - $6.50

Can Be Installed in Less Than 20 Minutes by the Average Layman.

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"A Shock Absorber and Rebound Snubber in One"

When the car is standing still, the shock absorber is in a normal position; therefore, when the car starts it takes the slightest action or greatest concussion. On the rebound motion of the car, as soon as shock absorber spring reaches its normal position, it starts to stretch or pull, thereby positively eliminating the extensive rebound which is so common on Ford cars. Can be installed without changing or altering any of the Ford parts or taking away any of the natural action of the Ford spring

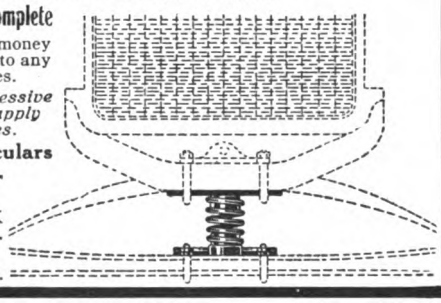
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Easy to Use— Easy to Sell

Every buyer of a SHALER 5-Minute Vulcanizer becomes a booster! Every motorist who buys one shows it to his friends—gives them a demonstration—because it is such a wonderful thing.

This means big sales for you. As soon as you start selling the SHALER 5-Minute Vulcanizer, your customers will spread the news. You will quickly notice new faces in your store—new customers passing their money across your counters.

Complete Outfit $1.50
Including 12 Patch & Heat Units

The six round and six oblong patches and combustible discs that go with the vulcanizer are soon used up—and the motorist comes back to you for more. He pays you 75 cents for every dozen of these units. You make a good profit.

Can you realize what a big repeat business this means for you? Can't you see how it will bring car owners into your place for additional "ammunition"—who will also buy other goods? And that is what you need to build up your business!

Place Your Order with Your Jobber NOW

Don't delay! The enormous demand for SHALER 5-Minute Vulanizers has exceeded our factory capacity to make deliveries. We are building a large 3-story addition to our plant. But—to make sure of prompt shipments—place your order with your jobber now specifying date of shipment desired.

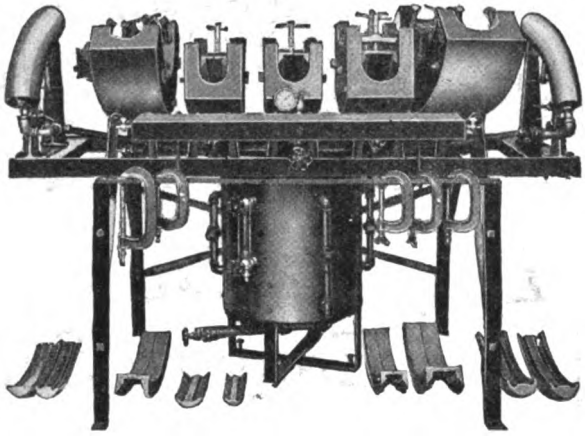
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All the work you can do. Big profits on every job. We give instructions, sell you complete equipment and tell you how to start.

We show you everything; send you names of men formerly working for small pay, now doing flourishing business. Tire Factories say we have the only vulcanizer that operates upon **correct** principle—that repairs tires exactly as they were made.

VANDERPOOL VULCANIZER

Now used by veteran tire repairers after trying all other makes.

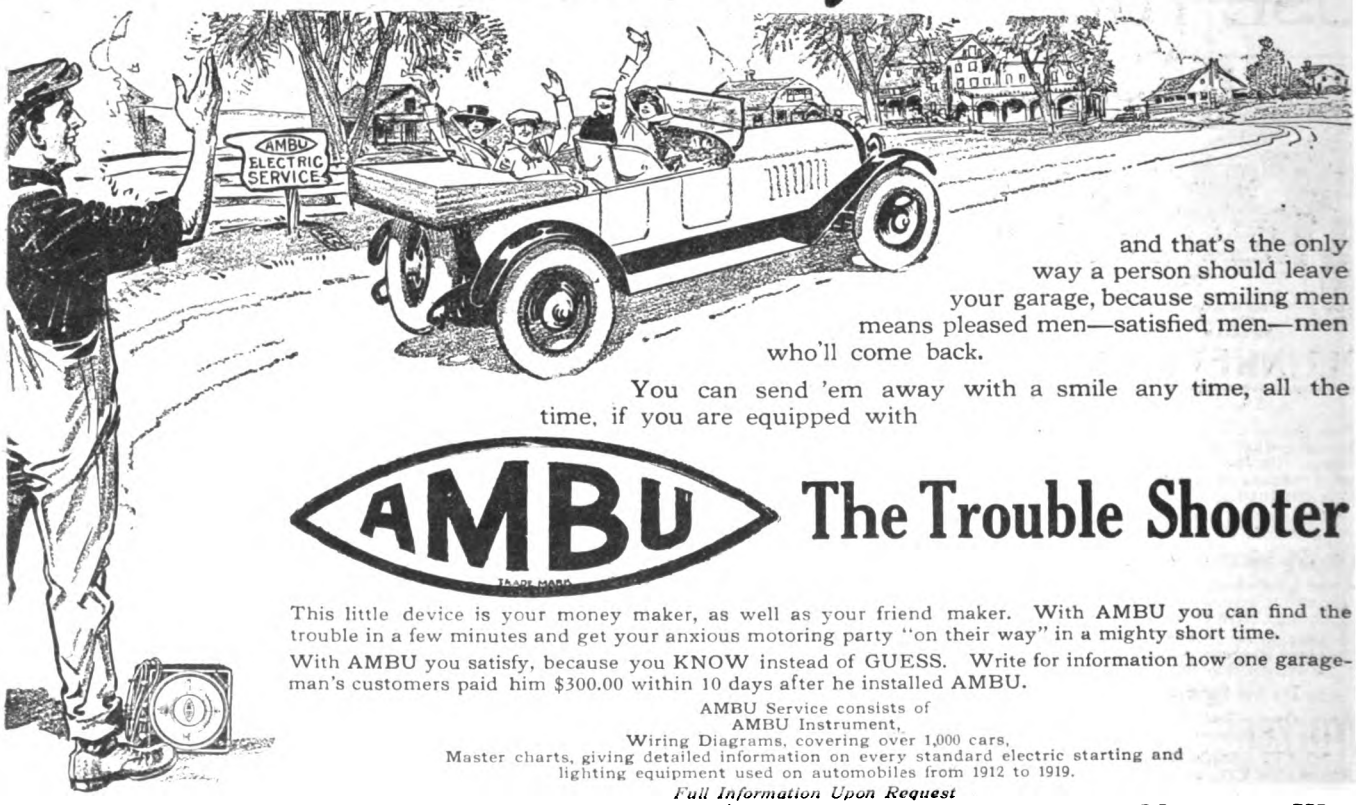
Cheapest to operate. **Pays for Itself.** 5 Cavity Model does $100 worth of work a day. (Smaller 2 and 3 cavity sizes also.) Millions of tires now in use and need constant repairing. You cannot fail.

Write us at once for **Tire Repairing Manual** and full particulars. Biggest money-making business now open to you. Write today.

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You Can Send 'Em Away with a Smile



and that's the only way a person should leave your garage, because smiling men means pleased men—satisfied men—men who'll come back.

You can send 'em away with a smile any time, all the time, if you are equipped with

AMBU The Trouble Shooter

TRADE MARK

This little device is your money maker, as well as your friend maker. With AMBU you can find the trouble in a few minutes and get your anxious motoring party "on their way" in a mighty short time.

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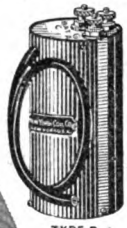
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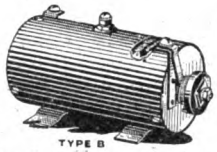
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everywhere are buying our Spark Coils and Resistance Units for replacement on all battery ignition equipped cars.


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MAKE YOUR OWN ELECTRIC LIGHT

And Make Big Profits At The Same Time Charging Auto Storage Batteries With The

HB LIGHTING AND BATTERY CHARGING OUTFIT

Hundreds of garages where electric current is not available are using this money-making equipment. Operates from line shaft or engine, giving ample capacity for brilliant lights at low cost and recharging from one to six 6-volt auto storage batteries at one time. Income 75c to $1.50 per battery, with average cost of only 12c to 15c.



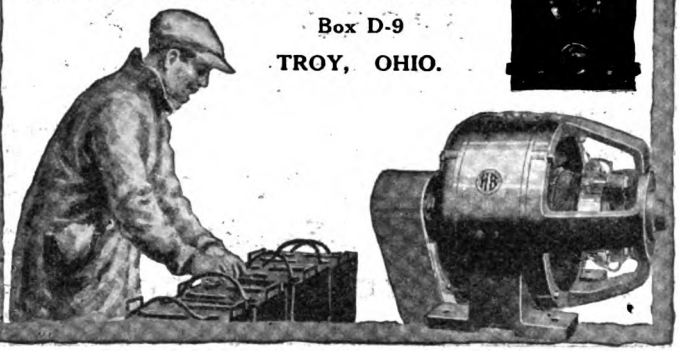
$18.50 Puts this Money-Making Outfit in your Garage

Balance in 10 monthly payments of $12.00 each. Write for full information, or send cash payment with trial order. Under absolute money-back guarantee, you run no risk.

We furnish also electrically operated equipment. Write for information.

HOBART BROTHERS COMPANY
Box D-9
TROY, OHIO.





$25 Worth
of tools for $16.00

SENT ON APPROVAL FOR $2, BALANCE PAID ON ARRIVAL IF OUTFIT SATISFIES

Here's a complete repair outfit—arranged in about the most convenient manner you can imagine. Everything you need—everything in its place—and every tool of good dependable quality.

The Stewart Handy Worker is a wonderful combination of tools (six in one). Outfit includes strong practical anvil; powerful vise up to 4¼ inches; a sure-grip steel pipe vise; corundum grinding wheel, 5 inches by 1 inch; a two-speed drill press, with 2 drills; a metal cutting wedge and driving mechanism of three speeds—direct, 4 to 1 and 16 to 1—easily regulated by changing handle grip. It operates grinding wheel, buffing wheel and many other similar tools. All for $16.

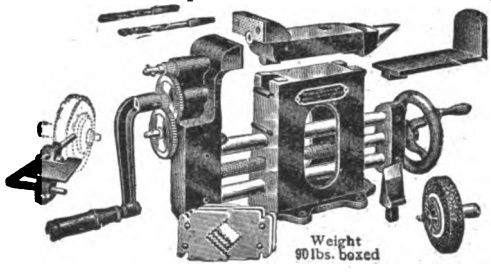
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Accept our approval offer—send $2 with order, pay balance on arrival. If not satisfactory in every way, return and money will be refunded.

Descriptive Booklet Mailed on Request

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Stewart Handy Worker


Weight 90 lbs. boxed



Here is the practical, successful working-out of the idea of a Liquid Carbon Remover—with its vast economies to car owners and sales opportunities for the trade.

The great saving in gasoline by keeping cylinders carbon-free; the great economy of the Carbon Remover over the boring-out method; the great advantage of cleaning cylinders without laying up the car—**all are realized** with this

WONDER WORKER

article. The Wonder-Worker Carbon Remover gets results in **30 minutes**—without the slightest injury to the motor. It loosens the carbon from the metal—so that it's **blown out** through the exhaust.

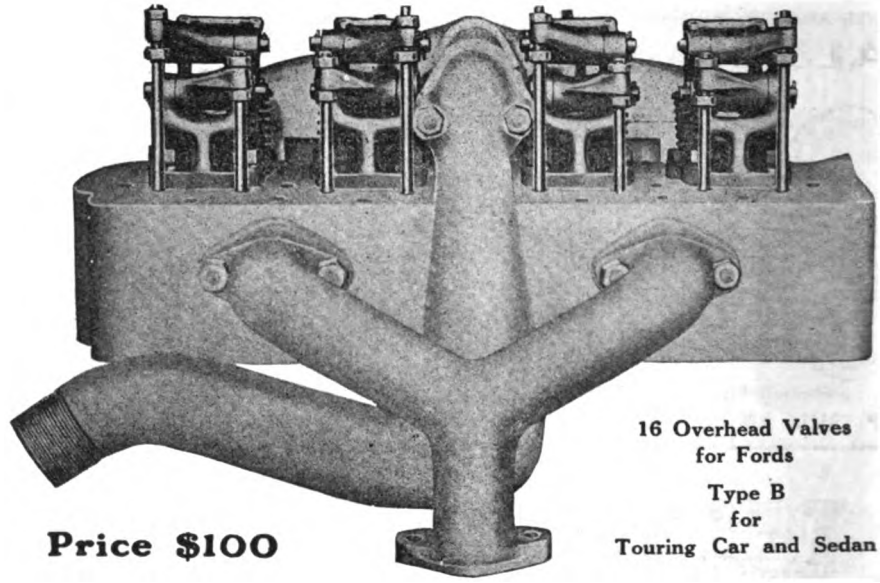
Let WONDER-WORKER Carbon Remover prove to you how the Wonder-Worker Specialties actually deliver results that have only been claims in the past. Descriptions and prices of complete line in catalogue; copy should be in your hands.

THE HALL-THOMPSON CO.
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Intake side type B, the latest Roof 16 valve design for Ford touring cars. Exhaust and manifold operate on same side. Note how intake is heated by exhaust manifold, both manifolds being in contact with each other at the division point on the intake, giving all the advantage of hot spot manifolds. Note the simplicity of the design, how easy it can be installed, and that threaded end of exhaust manifold can be connected with regular Ford exhaust pipe.



16 Overhead Valves for Fords
Type B
for
Touring Car and Sedan

Price $100

SPEED POWER ECONOMY

Speed to climb the steepest hills as you never dreamed of before. Power to double the value of your converted Ford truck, the load carrying capacity of which is only limited to the strength of the rear axle. Speed for the road or for the track to rival the high cost racing cars. A long list of racing car drivers, winners of speed contests, show what you can look for if you want a snappy speedster or a race track winner. Special equipment for touring car, truck and racing car for $100.00. Extra racing equipment at special low prices. Get our quotations on high speed cam shaft, gray iron pistons, aluminite connecting rods, Lynite pistons and rings complete, counter-balances for crank shaft, nickel steel racing gears 3 to 1 ratio, special oiling systems, fast carburetors and beautifully designed racing bodies. Every Ford owner a likely prospect and every Ford converted truck owner a sure sale. An absolute necessity to every owner of a fast Ford.

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♥QUICK SERVICE♥

Have You Had Trouble With Your Tires?

The fault is not with the tires. You, or your chauffeur, or both, are to blame. The responsibility is yours because you should keep the tires pumped up to a specified pressure, and don't.

Tires that are kept up to the proper air pressure last twice as long—sometimes ten times longer—than tires that are run with not enough air in them. Measure your air daily with a

SCHRADER UNIVERSAL TIRE PRESSURE GAUGE

and get out of your tires all the miles they can give.

Price in U. S. A. $1.50

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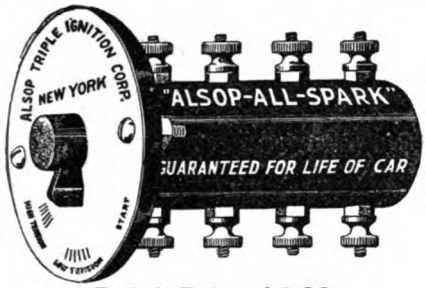
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Prevents running engine with a misfire and the delays from changing spark plugs on trips.

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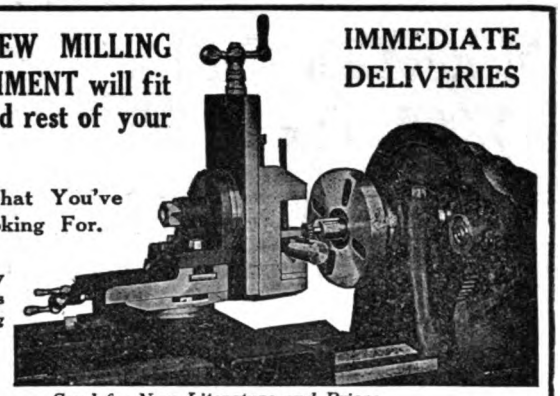
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90,000 Springs. 588 Types.

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PROVE THE QUALITY OF THE

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Shurnuff

TRADE MARK

Necessities for Ford Cars

Shurnuff Grease Retainers: Price per pair, 90c; Canada, $1.35.

Shurnuff Running Board Fender Support: Price per pair, $4.50; west of Rockies, $4.75; in Canada, $6.75.

Shurnuff Combination Manifold: Price, $9.00; west of Rockies, $10.00; in Canada, $12.50.

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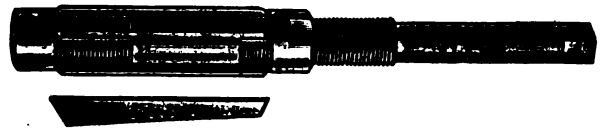
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The best made for repair work

The Critchley Expanding Reamer

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Try One and You Will Want More.



Reams odd size holes

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SAVE GASOLINE

with PRESSURE PROOF Piston Rings





THEY will cut down the amount of gasoline and oil you normally use—keep your motor free from carbon—give it added power and keep it at top-notch efficiency. One Pressure Proof 3-part ring or two Pressure Proof 2-part rings is a full piston equipment.

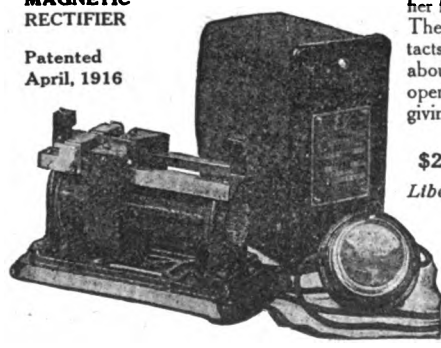
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MAGNETIC RECTIFIER

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Also F. F. Charging Rheostats for use on D. C. current.

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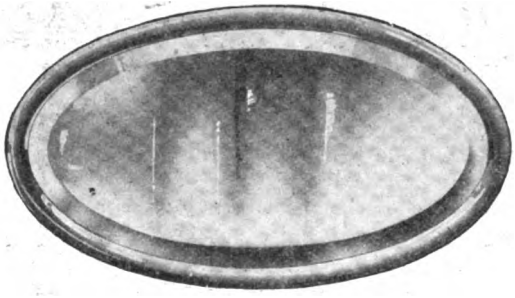
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No. 3-C


No. 2-C


No. 1-C

"Classic" Curtain Lights—*Improved*

All screws banished.

Frames of very unique construction—simply snap together.

This grips the curtain material evenly and securely, making it impossible to sag and wrinkle.

It also makes a water-tight job.

A cutting pattern is furnished with each light, so that all trouble for trimmers is removed.

CLASSIC CURTAIN LIGHTS are shipped with glass permanently secured in the outside frame, thus eliminating all glass breakage in setting.

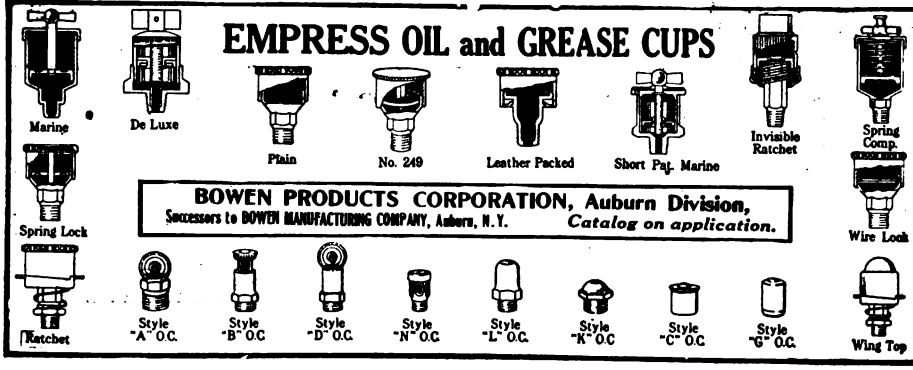
Standard "CLASSIC" finish is American nickel silver.

We are prepared to make prompt deliveries.

Get your name on our mailing list for SMITH BULLETINS; they keep you up-to-date on Automobile Hardware.

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GET ANOTHER 5000 MILES OUT OF YOUR OLD TIRES

Stop throwing away your money!

Save your old tires; for they mean dollars and cents to you. It makes no difference whether they are sand blistered, punctured, rim cut or blown out, McDaniel will put them back on the job.

SIZE	If You furnish 2 Casings	If You furnish 1 Casing	If I furnish Both Casings	Special Gray Tubes
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31x4	4.50	7.75	9.50	3.10
32x4	4.75	8.00	10.00	3.20
33x4	5.25	8.25	10.25	3.30
34x4	5.50	8.50	10.50	3.40
36x4	5.75	8.75	11.00	3.50
34x4½	5.75	9.00	11.50	4.10
35x4½	5.75	9.25	12.00	4.25
36x4½	6.00	9.50	12.50	4.35
35x5	6.25	10.50	13.50	5.00
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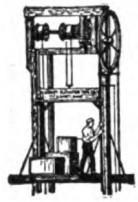
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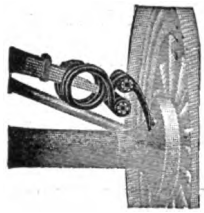
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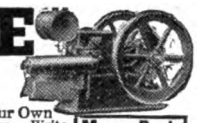
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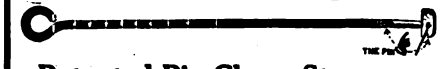

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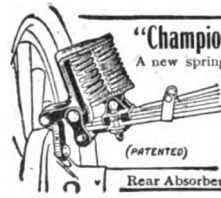

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Many accessories are well advertised, but there are not many that have the advertising that Steer Warms are going to have this Winter. We are taking large space in the Saturday Evening Post, Literary Digest, American, Ladies' Home Journal, Successful Farming, Motor, and many smaller publications.

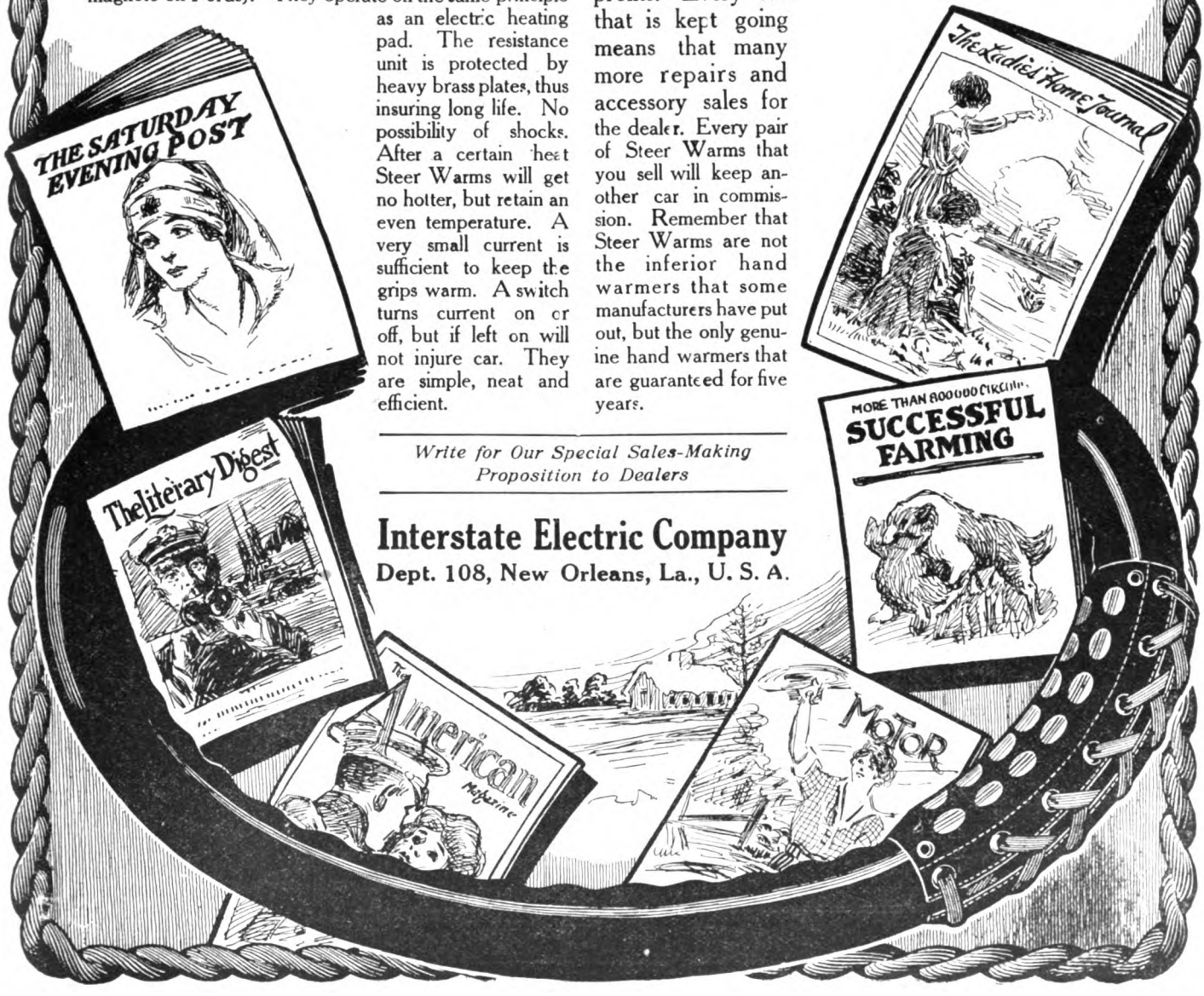
Steer Warms

The Electric Hand Warmer That is Guaranteed

DESCRIPTION

Steer Warms consist of two neat leather-covered grips, one for each hand, which lace onto the steering wheel at any place convenient for driving. Steer Warms are heated by electricity from the storage batteries (or magneto on Fords). They operate on the same principle as an electric heating pad. The resistance unit is protected by heavy brass plates, thus insuring long life. No possibility of shocks. After a certain heat Steer Warms will get no hotter, but retain an even temperature. A very small current is sufficient to keep the grips warm. A switch turns current on or off, but if left on will not injure car. They are simple, neat and efficient.

will be advertised to millions of people, and our ads will reach practically all the five million car owners of the United States. Dealers should tie up with this advertising in order to increase their winter profits. Every car that is kept going means that many more repairs and accessory sales for the dealer. Every pair of Steer Warms that you sell will keep another car in commission. Remember that Steer Warms are not the inferior hand warmers that some manufacturers have put out, but the only genuine hand warmers that are guaranteed for five years.



Write for Our Special Sales-Making Proposition to Dealers

Interstate Electric Company
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You can know what each truck earns-



GUARDING your interests unfalteringly, the Jones Recorder is your confidential agent. It tells you—and you only, exactly what was done in any five-minute period of the day or night. You can positively know the actual cost of work. Because a Jones Recorder tells with accuracy each and every move of truck or driver. And it's "driver-proof"—it tells you confidentially if anybody tampers. There is a black and white daily record locked up in its body—the key is yours—to this, and to an actual knowledge of your real earnings—earnings based on unit costs.

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1. The time of start and return to garage.
2. The number of stops made.
3. The time, day or night, and duration of each stop.
4. The number of runs made.
5. The time of and duration of each movement.
6. The mileage covered on each run.
7. The average speed of each run, every five minutes.
8. And it records both forward and backward movements.

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The Jones Recorder Sold by Johns-Manville

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"THE RING THAT MAKES THE MOTOR SING"

are the best gas-tight rings for overcoming engine troubles due to carbon—knocking, skipping, faulty ignition; valve pitting, wearing down of cylinder walls, piston and piston rings; smoky exhausts.

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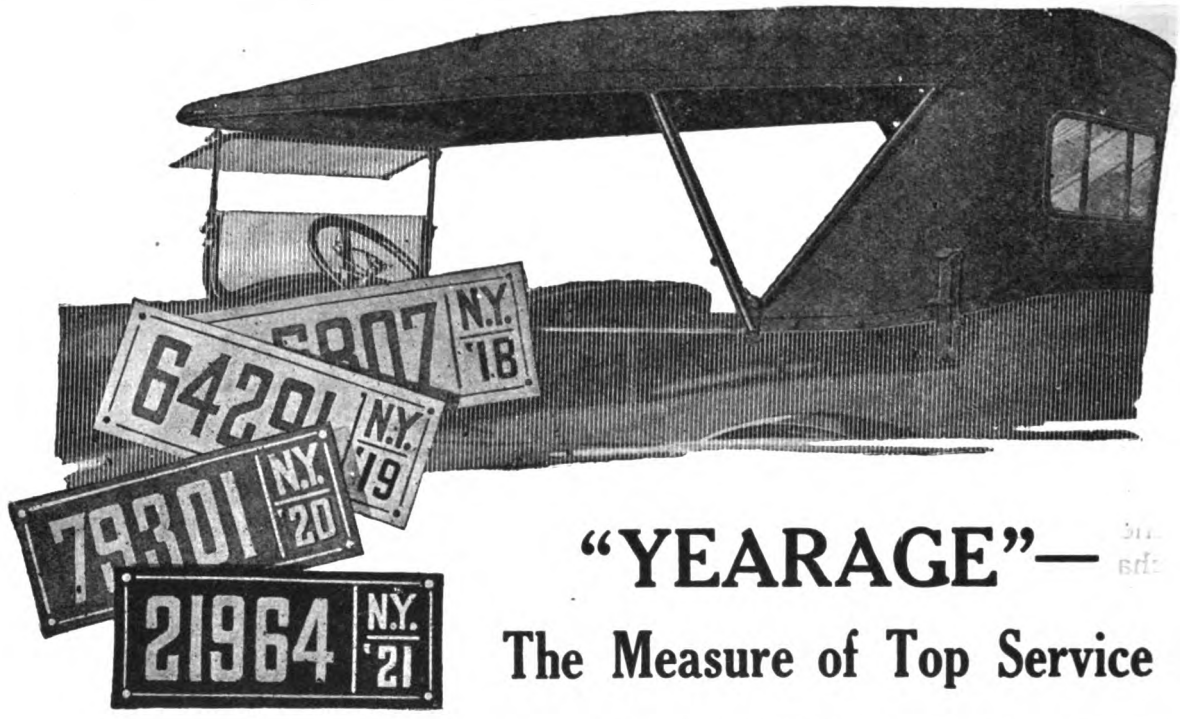
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The Ring that Makes the Motor Sing

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with reasonable care will last as long as your car. In addition to being water, dirt, dust and grease proof—in addition to being washable—it maintains its flexibility permanently, because it is made of materials that will not harden, oxidize or disintegrate under changing climatic conditions.

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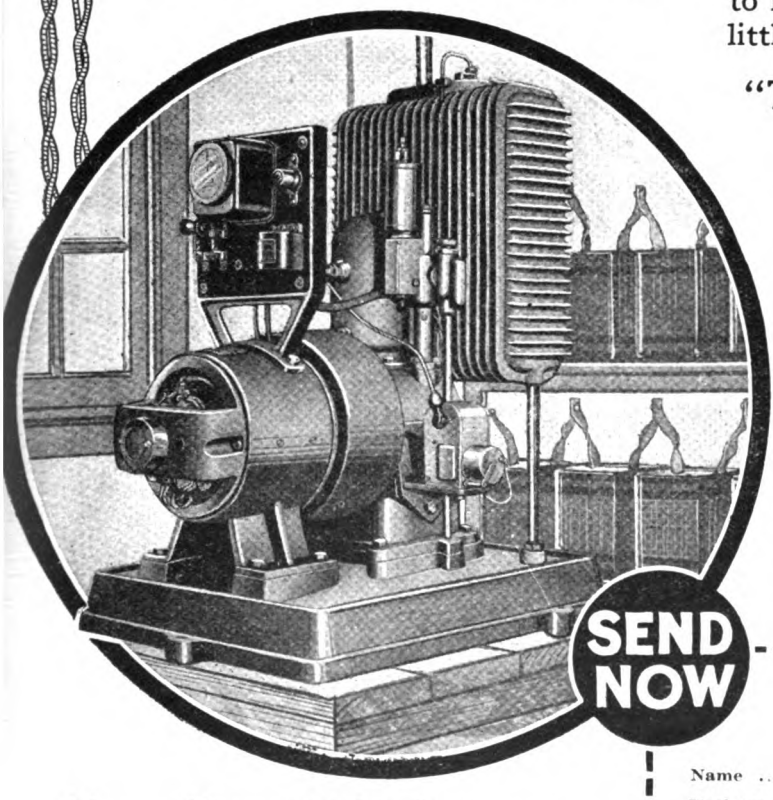
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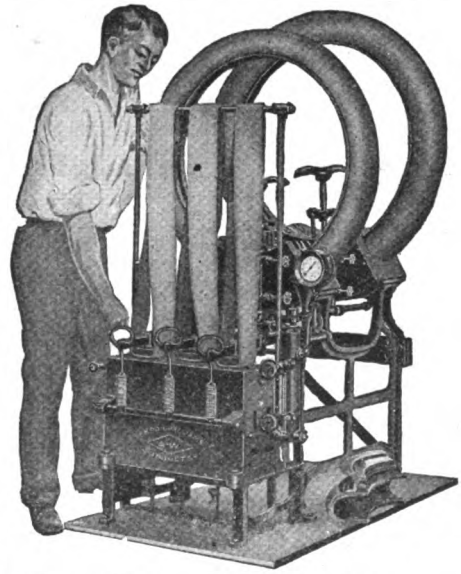
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With less NEW tires being made, more OLD tires must be repaired—add Tire Repairing to your business and ensure a steady return of profits.

Send for Catalog and Prices

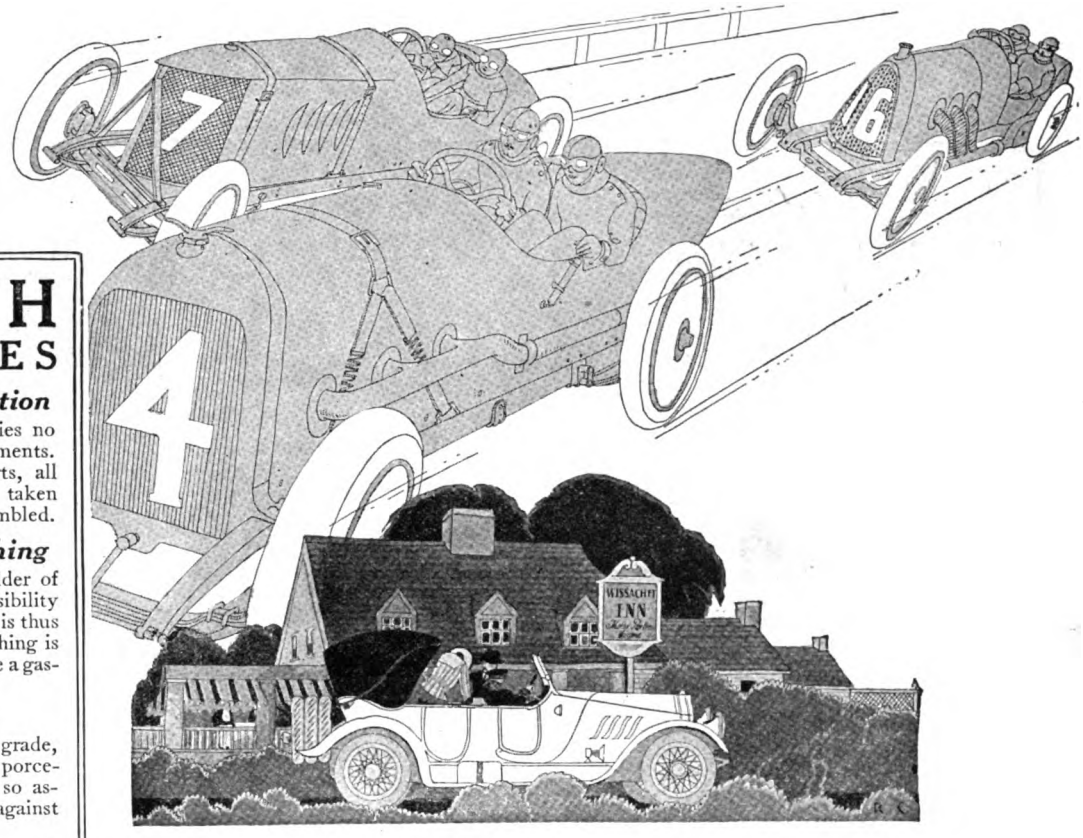
AKRON-WILLIAMS A-W PRODUCTS

THE WILLIAMS FOUNDRY & MACHINE CO.
GLENDALE STREET AKRON, OHIO

AKRON-WILLIAMS A-W PRODUCTS

Exclusive Distributors for California: THE WATERHOUSE AND LESTER COMPANY, San Francisco, Oakland and Los Angeles

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RAJAH FEATURES

Simple Construction

The Rajah Plug embodies no freak ideas or experiments. There are but five parts, all interchangeable, easily taken apart, cleaned and assembled.

Knife Edge Bushing

adjusts itself to the shoulder of the porcelain. All possibility of injuring the porcelain is thus eliminated when the bushing is tightened down to secure a gas-tight joint.

Insulation

consists of the highest grade, hardfire, heat-resisting porcelain, of special pattern, so assembled as to insure against firing through.

The Button Top and Rajah Clip Terminal

do away entirely with the necessity for either thumb screw, nut or other device for attaching the cable to the spark plug.

Rajah Terminals and Adapters

are furnished so that Rajah Plugs can be used with any car.



Rajah Regular Clip Terminal

Adjustable to any cable. With the extra collar supplied fits any make of plug.



Rajah Ferrule Clip Terminal

With any size ferrule required. Fits any make of plug with the extra collar supplied.



Rajah Thumb Nut Terminal

Adapter for Dodge, Ford, Hup, Hudson, Maxwell, Mitchell, Packard Twin Six and Pullman.



Rajah Stud Terminal

Adapter for Buick, Chevrolet and Oldsmobile.

Manufactured by

Rajah Auto-Supply Co.

Bloomfield, N. J.

Sales Department

Edward A. Cassidy Co, Inc.

280 Madison Ave., New York

Backed by the racing world

IN a few vivid moments the racing car driver asks more of his car than the average car owner demands in six months' ordinary running. For his supreme needs the racer uses Rajah Spark Plugs because he knows they will make good.

While the demands of your customers are not so exacting, they do want the service, the efficiency, the power and the economy that a perfect and consistent spark plug will give. They get these qualities when you sell them the plug upon which the racing world depends.

Sell Rajah plugs in sets. Get your customers to take out all other plugs and try Rajahs as they should be tried.



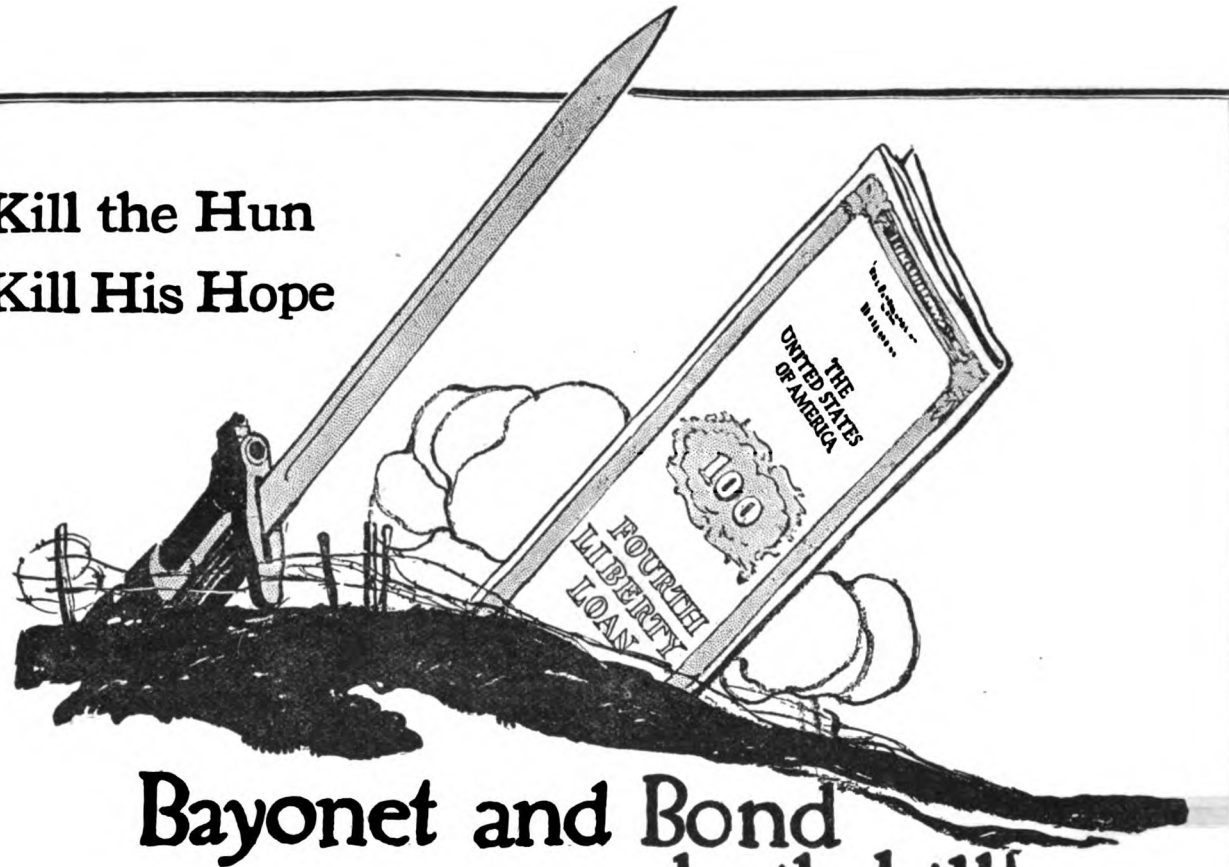
That is the only way for them to enjoy the increased power, quick pick-up and uninterrupted Rajah service.

RAJAH SPARK PLUGS

Please Mention the Automobile Dealer and Repairer when writing to advertisers.

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Kill the Hun
Kill His Hope



Bayonet and Bond -both kill!

ONE KILLS the Hun, the other kills his hope. And to kill his hope of victory is as essential right now as to kill his fighting hordes. For while hope lasts, the Wolf of Prussia will force his subject soldiers to the fighting line.

We have floated other loans, built a great fleet of ships, sunk pirate submarines, sent our men across and shown the Kaiser's generals what American dash and grit and initiative can do. The Hun has felt the sting of our bullets and the thrust of our bayonets. He is beginning to understand America Aroused—to dread the weight of our arms and energy.

This is a crucial moment. Nothing can so smother the Hun morale, so blast his hopes, as a further message from a hundred million Freemen, a message that says in tones that cannot be misunderstood, "Our lives, our dollars, our ALL—these are in the fight for that Liberty which was made sacred by the sacrifices of our forefathers."

Buy U. S. Government Bonds Fourth Liberty Loan

Contributed through Division of Advertising

United States Govt. Committee on Public Information

This space contributed for the Winning of the War by

The Publisher of AUTOMOBILE DEALER AND REPAIRER

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"For Service:—The vast resources and facilities of the Remy, Delco and Klaxon organizations are merged into one, i. e.—The United Motors Service Inc."

SERVICE

—on REMY
—on DELCO
—on KLAXON

United Motors Service branches are in the north, east, south and west. At every branch you'll find complete equipment of Remy, Delco and Klaxon parts;—at every branch you'll find *service*, quick and sure.

United Motors Service Inc. branches in the following cities at present rendering service on Remy only:

Denver
Minneapolis
Cleveland
Boston
Atlanta

15 cities in which there are United Motors Service Inc. service stations for Remy

United Motors Service Inc. branches in the following cities giving service on Delco, Klaxon and Remy:

Kansas City
Chicago
Detroit
Los Angeles
San Francisco
New York

66 cities in which there are United Motors Service Inc. service stations for Klaxon

MOTORS SERVICE
TRADE MARK

General Offices:
Detroit, Mich.

UNITED MOTORS SERVICE

INCORPORATED

Please Mention the Automobile Dealer and Repairer when writing to advertisers.

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Firestone

CEMENTLESS TUBE PATCHES

LET these "first aids" take care of punctures on the spot. Easy to apply, they stick tight without a "pucker" or "creep." Identify them by the name Firestone and the tab on protecting muslin. Order from your jobber or direct.

FIRESTONE TIRE & RUBBER COMPANY
FIRESTONE PARK AKRON, OHIO

World's Largest Manufacturers of Tire Accessories and Repair Materials



Select proper size to fully cover injury.

After removing protecting muslin, moisten patch with gasoline.

Buff tube thoroughly, with buffer that comes with patches, to remove "bloom" from tube.

Apply patch over injury. Press down and allow it to "set" for a moment.

Please Mention the Automobile Dealer and Repairer when writing to advertisers.

Digitized by Google

30 minutes after you start using them

Give more power
Save gasoline
Save oil
Stop plugs fouling
Stop engine smoking

Within thirty minutes after you start your engine these rings will prove themselves to be an extremely profitable investment.

The minute oil grooves make it possible for these rings to seat themselves perfectly—almost instantly. The patent peening prevents waste of power by holding them to their tension against the cylinder walls even though the cylinders be worn out-of-true, and the wonderful "Always Tight" Expansion Joint compensates for any wear which may occur in the rings, keeping them permanently gastight.

Munger "Always Tight" Piston Rings are the easiest of all piston rings to install. Slip them over the Munger Ring Insertion Tool, which comes with each complete outfit, and they slide into their grooves without breakage or trouble of any kind.

A signed guarantee that these rings will do all we promise accompanies each complete outfit. If the rings do not give you entire satisfaction, return them at any time within thirty days to the dealer from whom you bought them, and he will give you your money back.

SPLITDORF ELECTRICAL CO., Newark, N. J.

Splitdorf Branch Houses and Service Stations:

Atlanta,	10-12 E. Harris St.	Minneapolis,	816 Hennepin Ave.
Boston,	68 Brookline Ave.	Newark,	278 Halsey St.
Chicago,	2613 S. Michigan Ave.	New York,	7 W. 61st St.
Dallas,	402 S. Ervay St.	Philadelphia,	210 N. 13th St.
Detroit,	1295 Woodward Ave.	Pittsburgh,	5943 Ellsworth Ave.
Kansas City,	1827 Grand Ave.	San Francisco,	1022 Geary St.
Los Angeles,	1215 S. Hope St.	Seattle,	1628 Broadway
		Toronto,	469 Yonge St.



The MUNGER "Always Tight" PISTON RING OUTFIT—
8 Regular Size Rings
4 Over-width Rings
1 Regrooving Tool
1 Ring Insertion Tool

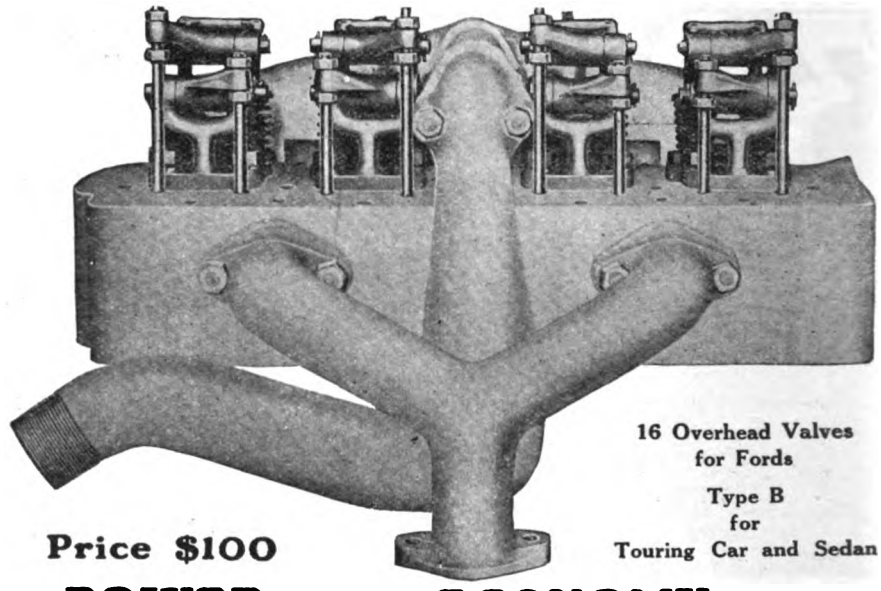


MUNGER "Always Tight" Piston Rings

Digitized by Google

Make Your Ford a $3,000 Car from the Standpoint of Motor Service.

Intake side type B, the latest Roof 16 valve design for Ford touring cars. Exhaust and manifold operate on same side. Note how intake is heated by exhaust manifold, both manifolds being in contact with each other at the division point on the intake, giving all the advantage of hot spot manifolds. Note the simplicity of the design, how easy it can be installed, and that threaded end of exhaust manifold can be connected with regular Ford exhaust pipe.



16 Overhead Valves for Fords

Type B for Touring Car and Sedan

Price $100

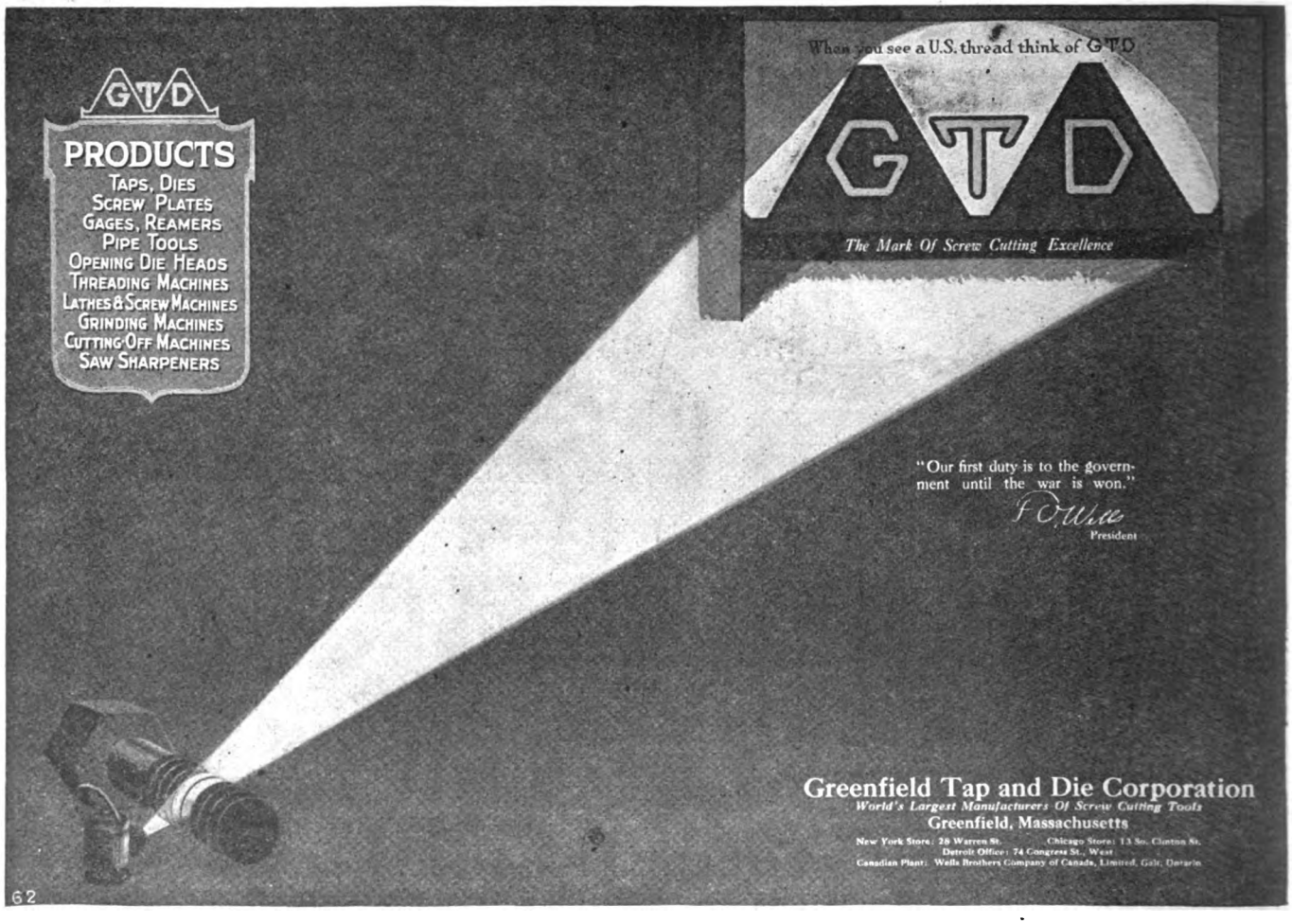
SPEED POWER ECONOMY

Speed to climb the steepest hills as you never dreamed of before. Power to double the value of your converted Ford truck, the load carrying capacity of which is only limited to the strength of the rear axle. Speed for the road or for the track to rival the high cost racing cars. A long list of racing car drivers, winners of speed contests, show what you can look for if you want a snappy speedster or a race track winner. Special equipment for touring car, truck and racing car for $100.00. Extra racing equipment at special low prices. Get our quotations on high speed cam shaft, gray iron pistons, aluminite connecting rods, Lynite pistons and rings complete, counter-balances for crank shaft, nickel steel racing gears 3 to 1 ratio, special oiling systems, fast carburetors and beautifully designed racing bodies. Every Ford owner a likely prospect and every Ford converted truck owner a sure sale. An absolute necessity to every owner of a fast Ford.

DEALERS: Get our distributing terms and quotations on the greatest selling specialty in America. Write today.

LAUREL MOTORS CORPORATION, ANDERSON, INDIANA

Made in the "Puncture Proof" City



Digitized by Google

IMPORTANT TO THE PUBLIC!

ENEMIES of magazines and magazine reading are now claiming that the heavier postage increases of 100 to 900 per cent in the destructive postal "zone" law falls **only** on the advertising pages and that the 50 per cent increase is merely upon the reading pages, therefore readers are not affected! **This is false in fact and principle!**

As a magazine cannot be separated from its advertising—advertising which makes possible in its quality and quantity—this claim is fallacious and the postage increase must fall upon the readers of magazines ***for the entire magazine,*** *no matter how deceptively it may be described and separated by the enemies of magazines and magazine readers.*

Do not be misled by the absurd camouflage that the destructive postal "zone" system affects **only** the advertising pages—**because the "zone" postage must be paid under the postal law for the entire magazine which you read.**

The advertising pages are part of each copy. These terrific postage increases of from 50 to 900 per cent are imbedded in each copy—depending upon the accidental remoteness of each reader—and necessarily apply, therefore, to each and every copy.

And the reckless efforts to disguise obviously unjust postage "zone" charges are plainly evidenced by the futile arguments of those who established the postal "zone" system—a "zone" system utterly condemned over fifty years ago when it was abolished by Abraham Lincoln.

Congress last year enacted this hasty but permanent postal legislation, despite the fact that it had been twice rejected by the United States Senate and also unequivocally condemned by the latest official United States Postal Commissions. This postal "zone" legislation reversed postal history. This postal zone law, moreover, has been condemned by Ambassador Gerard, who earnestly said it was a law that would **aid pro-German propaganda.**

The Hon. Charles E. Hughes headed the latest official United States Postal Commission, when he was Justice of the United States Supreme Court, and which reported emphatically against the postal "zone" system; and further emphasis is lent to this "zone" system condemnation by the statement of Charles E. Hughes himself, on June 27th of this year, 1918, in which he again states that this postal "zone" law **"is decidedly a looking-backward and walking-backward measure" in postal history!**

Magazines are sold to the reader at less than their cost of manufacture—the only manufactured product in the world of which this is true. Magazines are enabled to do this by reason of the revenue from advertising pages; and the increase of from 50 to 900 per cent postage on the advertising pages simply means that in that particular copy of the magazine are imbedded all of these postage increases running from 50 to 900 per cent falling, chiefly, with terrific postal increases in the West.

President Wilson explains the function of advertising in relation to readers and the public, for he said when Governor of New Jersey:

"It must be that those who are proposing this change of rates do not comprehend the effect it would have. **A tax upon the business of the more widely circulated magazines and periodicals would be a tax upon their means of living and performing their functions.**

"They obtain their circulation by their direct appeal to the popular thought. Their circulation attracts advertisers. Their advertisements enable them to pay their writers and to enlarge their enterprise and influence.

"This proposed new postal rate would be a direct tax, and a very serious one, upon the formation and expression of opinion—its more deliberate formation and expression just at a time when opinion is concerning itself actively and effectively with the deepest problems of our politics and our social life.

"To make such a change now, whatever its intentions in the minds of those who propose it, would be to attack and embarrass the free processes of opinion. Surely sober second thought will prevent any such mischievous blunder."

This discredited and reactionary postal "zone" system now resurrected in the face of a storm of protests from the ablest minds in our country, discriminates unfairly against readers in different states by reason of their accidental remoteness from the city of publication. Readers in Eastern and Northern states will pay less postage under this postal "zone" law than readers in Western states, **and for exactly the same magazines!**

REMEMBER—THERE IS NO POSTAL DEFICIT; LAST YEAR THERE WAS OVER $12,000,000 SURPLUS!

Write to your Congressman in protest against the law and do it NOW! And if you will assist by another occasional letter or argument with a friend send your name to Charles Johnson Post, 200 Fifth Avenue, New York City.

Write to Your Congressman at Once! DO IT NOW!

PETITION TO CONGRESS—Sign Here!

The spread of education, of culture, of scientific knowledge and advancement, and of our vast internal merchandising and manufacturing has been, and always is, vitally dependent upon the freest and cheapest circulation of periodicals. The penalties resulting from any restriction on the freest possible circulation of periodicals will be destructive of the best interests of our economic life and the opportunities of developing our best citizenship.

The postal amendment passed by the last Congress, increasing the postage on periodicals from FIFTY TO NINE HUNDRED PER CENT with its postal "zone" system, will throttle or destroy our periodicals at a time when the widest and most extensive circulation of publications is essential to the patriotism, education and upbuilding of our country.

Therefore, I, the undersigned, do most earnestly demand the repeal of this burdensome periodical postage amendment.

Name .....

City or County.....

Street Address.....

State .....

Periodicals mean much in your life. If you will help by a few arguments with your acquaintances and an occasional letter to your Congressman in a spare moment, put a cross mark here.

☞ *Will you help in securing the repeal of this iniquitous law?*

CUT OUT, MAIL TO CHARLES JOHNSON POST

A.D.R. Room 1417, 200 FIFTH AVENUE, NEW YORK CITY

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"NORMA"

"NORMA" PRECISION BALL BEARINGS

(PATENTED)

The user of a car or truck notes only the bare fact of failure. He concerns himself little with the cause of that failure. He puts the full responsibility up to the builder of the car or truck. His condemnation covers the machine as a whole—no matter how small the part to which the failure is directly chargeable.

Failure of a bearing in magneto or lighting generator means, in effect, failure of the car or truck. Responsible builders, therefore, have protected themselves by adopting magnetos and lighting generators embodying the security against bearing troubles for which "NORMA" stands.

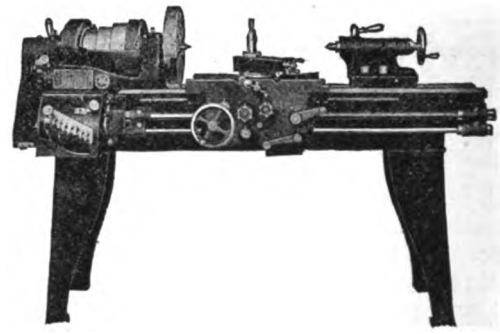
Be Sure—See that Your Electrical Apparatus is "NORMA" Equipped

THE NORMA COMPANY OF AMERICA

1790 BROADWAY NEW YORK

Ball, Roller, Thrust and Combination Bearings.

"NORMA"



14"x6' Monarch Lathe

Other Sizes, 16, 18, 20-Inch

Monarch Lathes are very accurate, rigidly constructed, modern in design and quick and easy to operate. They are recognized by the Automobile Repairmen as the best lathe for Garage use.

Monarch Lathes are low in price and within the reach of every garage owner. They are used in every class of work from the finest toolroom work to production work in the largest factories.

Furnished with taper attachment, milling, keyway cutting and gear cutting attachments, and other attachments useful in the Auto Repair Shop.

Send today for catalog No. 11 and prices

THE MONARCH MACHINE TOOL CO.

SIDNEY, OHIO

"WHITNEY" KEYS

FOR THE WOODRUFF SYSTEM

For the benefit of dealers, garages, and repair men, we are prepared to furnish our keys put up in two assortments. Every garage and repair man should keep these on hand. They may be purchased from the leading jobbers or ordered direct from the factory.

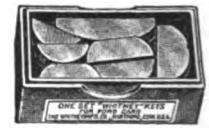


Regular Assortment

One hundred keys of the sizes most likely to be required for repair work.

Ford Assortment

One set of keys for the Ford car. These keys are of the special material and special treatment specified by the Ford Motor Company.

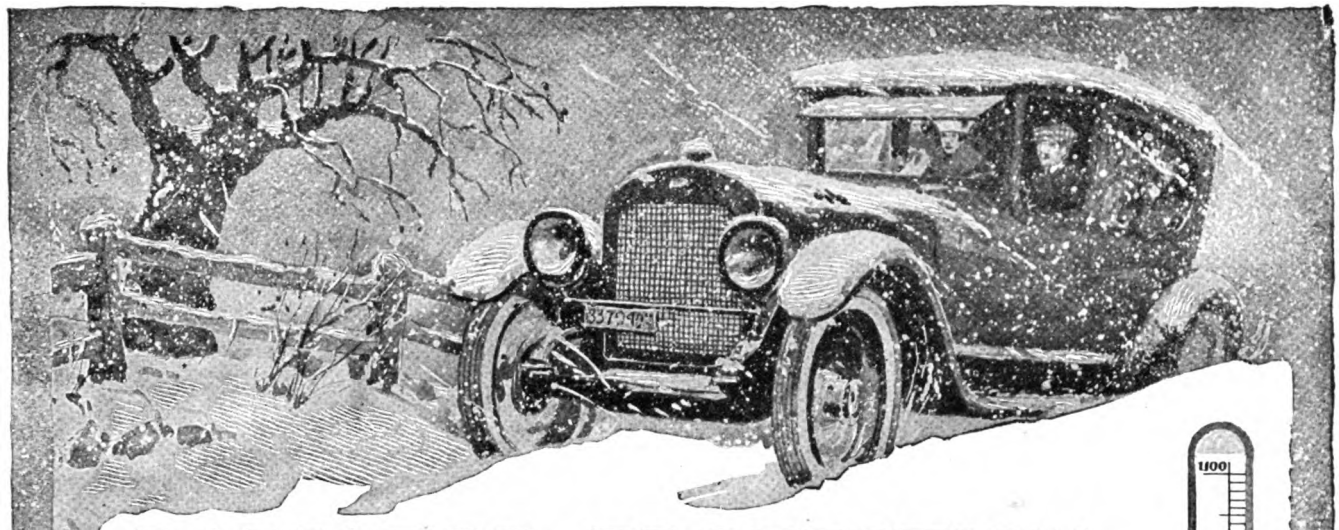


THE WHITNEY MFG. CO.

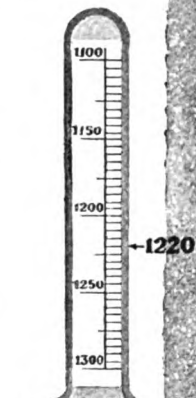
HARTFORD, CONN.

Chains Keys Hand Milling Machines

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RADIATOR PROTECTION
With the Guess Left Out



TO fill your radiator with Norwesco "TWELVE-TWENTY" is to *know* your radiator won't freeze above 20° below zero. Ordinary solutions deteriorate because of leakage or evaporation and you have a frozen radiator just when you think you are protected. A common battery hydrometer makes a quick, easy test with

NORWESCO
TWELVE-TWENTY
PREVENTS FROZEN RADIATORS

Comes in a "Chemically Correct" solution ready to use. No mixing. No measuring. No dissolving. Just pour into the empty radiator. Boiling point 12° higher than water—evaporates slower. Warms engine quickly—less "popping" on a cold day.

Will not "find" leaks like many non-freeze solutions.

Made by creators of SE-MENT-OL, the radiator cement with a million users, and SKALEX, the radiator cleaner.

Price $1.25 per gallon can, $3.45 per 3-gallon can, $5.00 per 5-gallon can. (20c per gallon additional West of Rocky Mts.)

Write for our 20-page booklet, "Care of the Cooling System." It contains many valuable suggestions.



The Northwestern Chemical Co.

1310 State Street MARIETTA, OHIO, U. S. A.

DEALERS—Write for our proposition and ask about our Saturday Evening Post advertising.

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PERFECT POWER FROM EACH PISTON



A ONE-PIECE PISTON RING

GILL PISTON RINGS are self fitting, ONE-Piece rings of sturdy construction. They have a distinctive joint which absolutely prevents the escape of compression, the formation of excessive carbon, or the pumping of oil into the combustion chamber.

ASK YOUR DEALER for GILL PISTON RINGS, or write us today.

GILL MANUFACTURING CO., 351 W. 59th St., Chicago, Ill.

S-M-C

Trade Mark Registered U. S. Pat. Office

ASBESTOS BRAKE LINING

meets every emergency — is everlastingly durable. Will not burn, glaze or crumble.

When automobiles were simply considered pleasure cars any old brake lining might do—provided the car owner was willing to risk his life and his car.

But now, when every car should be on the road every day to relieve congested transportation facilities—the use of dependable S-M-C becomes a patriotic duty.

See the S-M-C *on every roll of brake lining. Its use means* Safety Made Certain.

Made in rolls of all widths up to 6 inches.

Staybestos Mfg. Co., 5541 Lena St., Philadelphia, Pa.
I want your quantity prices on S-M-C Brake Lining and Universal Transmission Lining—particularly on your $1.25 FORD Set.
Name.....
Address.....
City.....
State.....

UNIVERSAL

Trade Mark Registered U, S. Pat. Office

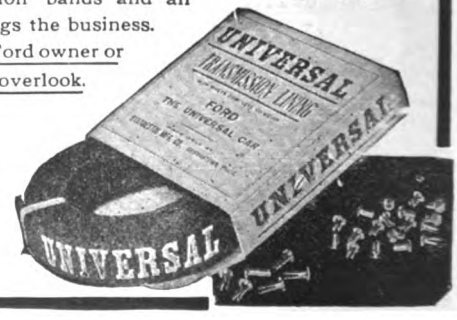
TRANSMISSION LINING

A wonderfully efficient cotton lining made by the makers of S-M-C Brake Lining. Compactly woven like S-M-C, treated with a perfected compound—which makes it water-proof and oil-proof. Absolutely chatterless. As quick as it is quiet.

This Handy Set For FORDS

—complete with three proper lengths for Ford transmission bands and all rivets required, brings the business. An opportunity no Ford owner or dealer can afford to overlook.

$1.25 Complete



STAYBESTOS MFG. CO.

5541 Lena Street, Philadelphia

The "Modern Factory" equipped to make all types o. brake lining and all widths up to 6 inches

Digitized by Google

VULCANIZERS Complete Cure—One Heat **MILLER** TIRES Extra Ply—5,000 Miles

NEW 1918 MODEL "4 CAVITY" EN BLOC

Insulated Air-Cooled Flanges Prevent Marking Tires

Complete---Gas Burner

$165.00



One of the 60 Kinds in Style

From 90c up

We teach Tire Repairing FREE OF CHARGE at factory or by mail.

Extra Ply Tires

Give More Miles at Less Cost

"COG" & "Wrapped" Treads contain 25% more Fabric and Rubber than Standard.

More Fabric Means Less Blowouts—More Miles

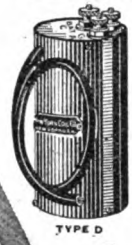
New 80-Page Catalog on Request

Exclusive Tire Distributors are Repeating Sales

For Price-Lists—Repeat Sales System

WRITE DEPT. "H" CHAS. E. MILLER ANDERSON, IND., U.S.A.

NEW YORK REPLACEMENT COILS AND RESISTANCE UNITS





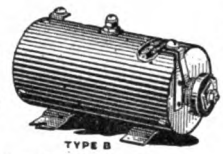
Service Stations AND Garage Men

everywhere are buying our Spark Coils and Resistance Units for replacement on all battery ignition equipped cars.





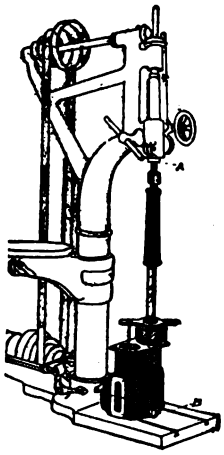






Western Distributor: ray-Heath Co., 1440 Michigan Ave., Chicago, Ill.

NEW YORK COIL COMPANY
338 PEARL ST. NEW YORK CITY



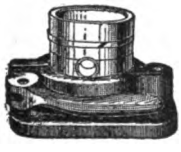
STORM

CYLINDER REBORING MACHINES

Are Making Big Profits for Thousands of Repair Shops

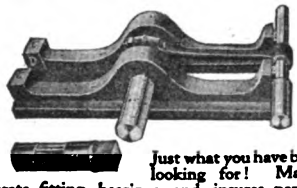
They are *Simple, Speedy, Accurate* and *Reliable* for hand or power. Adjustable for different sizes and are made in varied capacities to suit your requirements.
Also special Machines for Ford and Dodge.
No shop complete without one.
In daily use in United States and foreign countries.

The Storm Piston Vise



Holds the Pistons firmly while repairing or replacing bushings, pins, rings and rod. Saves time and prevents damage.

The Storm Connecting Rod Bearing Reamer, Jig and Straightening Gauge



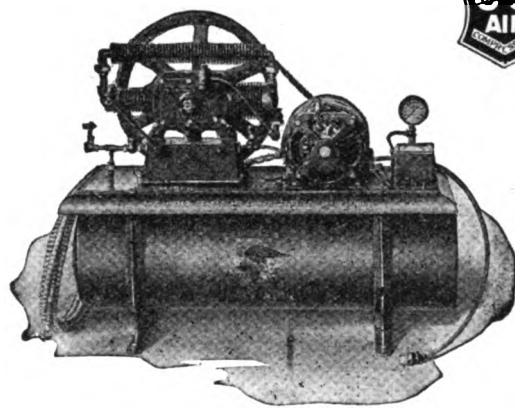
Just what you have been looking for! Makes accurate fitting bearings and insures perfect alignment. With it, your cheapest man can do expert bearing work.

We also manufacture the Storm Valve Tool, Special Pistons, Etc.

For Sale by Leading Jobbers. Write for Catalog.

STORM MFG CO.

Dept. A-26 THOMPSON, IOWA



If It's an Air Compressor, You'll Find It in the U. S. Line

THE United States line is complete, containing air compressors for every service up to 500 pounds pressure. Compressors are furnished in both Two-Stage and Single-Stage types, and every unit is absolutely guaranteed.

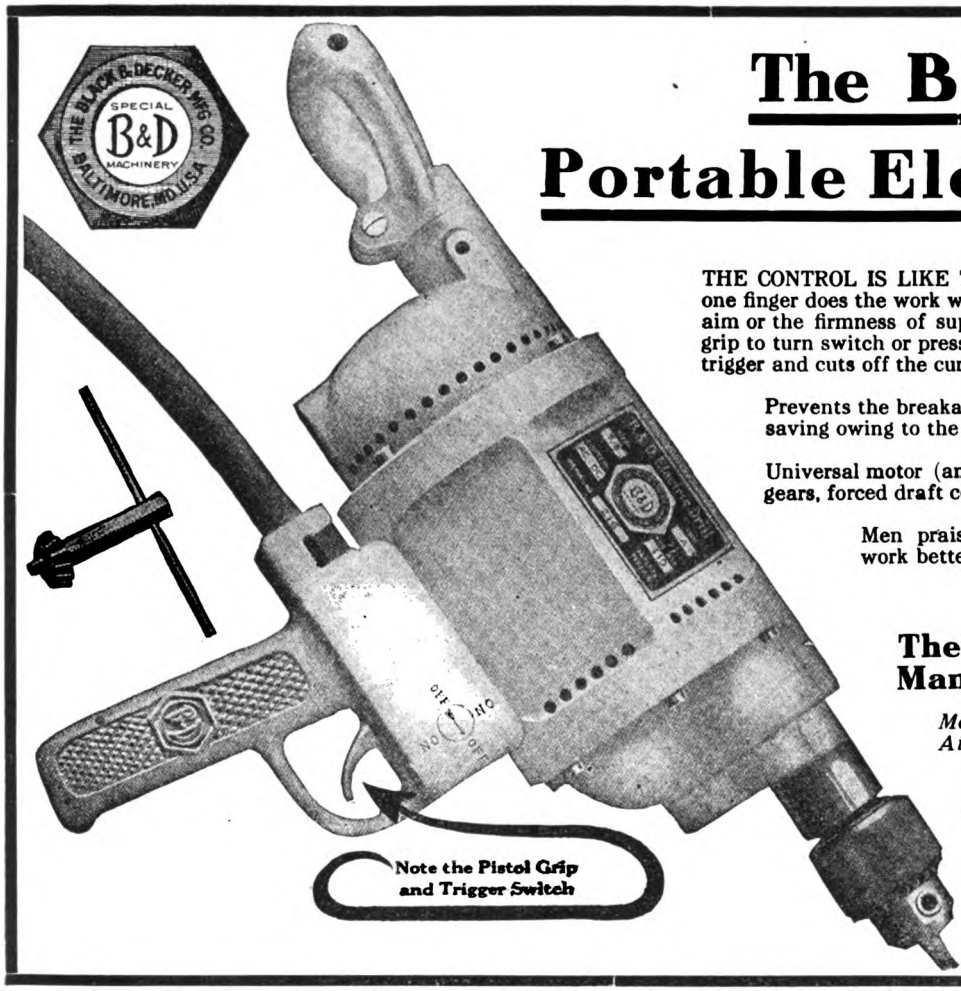
The U. S. Two-Stage De Luxe Automatic Air Unit illustrated above is a remarkable machine, perfectly adapted for a majority of garages, tire shops and service stations. It contains 14 improved features, several of which are exclusive.

Be assured of satisfaction. Write today for the U. S. literature.

The United States Air Compressor Co.
6542 Carnegie Avenue
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The B & D
Portable Electric Drill



THE CONTROL IS LIKE THAT OF AN AUTOMATIC PISTOL—one finger does the work without affecting the steadiness of the aim or the firmness of support of the tool. No taking hand off grip to turn switch or press button. Your finger merely pulls the trigger and cuts off the current.

Prevents the breakage of drills which now means a genuine saving owing to the uncertainty of deliveries.

Universal motor (any current), ball thrust bearings, steel gears, forced draft cooling system.

Men praise the B & D Portable because they work better with it. Fully Guaranteed.

Write for full description.

The BLACK & DECKER Manufacturing Company,

Makers of Lectroflater Electric Air Compressors,

South Calvert Street

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Distributors in Canada:
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LIMITED
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True in any position



HERE'S another of the famous line of "YANKEE" Tools for speeding up jobs and assuring accuracy in repair and construction work. A boon to the short-handed garage or machine shop!

"YANKEE" Vise No. 1993

Lock it to Swivel Base, in any direction, with Screw and Camthrow Lever. Or remove it from Base and use in any position—on side, bottom or end. Machined square. No need to remove work from Vise to take it to drill press or other machine—no resetting for each operation. No other vise can equal its capacity for usefulness and time-saving!

Price, with Swivel Base, $7.75

Your dealer can supply you

The "'Yankee' Tool Book"—FREE—illustrates and describes all "Yankee" wood-boring, metal-drilling and screw-driving tools. Write us for it.

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Body 7¼x2¾ (wide) x 3 inches. Height, with base, 5¾ inches. Weight, 13⅜ lbs. Jaws faced with hardened steel; open 3⅛ inches.

V-grooved Steel Block for holding different size round and irregular shapes at any angle.

"YANKEE" TOOLS Make Better Mechanics

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The One Best Bet in a Wheel and Gear Puller



A "Find" For Repair Shops and Garagemen

A ONE-MAN PULLER

Quick acting, strong, and simple in the extreme. This positive grip is a garage necessity that is worth its weight in gold. It adjusts to work instantly and can be locked in any desired position.

Ten Days' Trial

If your dealer or jobber does not have them, we will send you one. Try it ten days. If not satisfactory, return it to us and we will refund your money.

Jobbers and Dealers, Get Our Proposition

We Also Make the Beach Rim Tool

THE GREB COMPANY, 197 STATE ST. BOSTON, MASS.

BEACH



"Wallop" your rim with a hammer to force it in or out of place and you are bound to have greater trouble next time.

Do the Sensible Thing

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For Ford Pleasure and Commercial Cars, the Ford dealer is now assured of a high-class radiator, carefully constructed, that will render service efficiently and greatly improve the operation of the motor.



"Superford" Radiator Units are made entirely of brass

Model No. 16-F
For 1909 to 1916 Ford Cars. Made like the 1918 in two units with black detachable casing.
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For 1917-1918 Ford Cars, made in two units, with black detachable casing.
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Make the Old Car Look Like New—

Give it a coat of

"F-S" "Evernew" Auto-Body Enamel

It works easy and dries quickly, shows no brush marks. Gives a durable surface that is bright and attractive. Eight standard shades—special shades to order.

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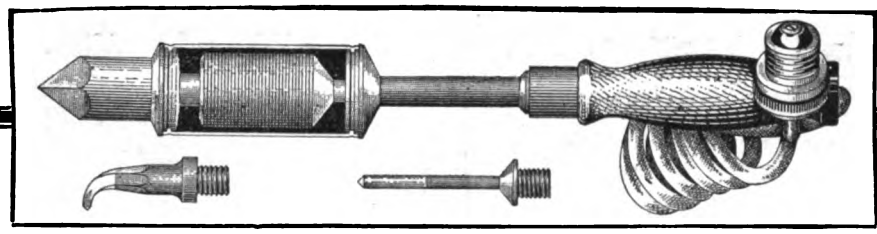
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"Evernew" Auto-Top Dressing revives and waterproofs old tops, yet leaves them pliable.

(18-2)

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"NO-BURN OUT" VEA HEATING ELEMENT

HEAT QUICKEST—RETAIN HEAT LONGEST

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of National Rubber Tire Filler was won through exceptional performance in forever eliminating the bugaboo of auto pleasure—punctures and blowouts.

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Seamless Steel Tubing

Over 3,000,000 Feet on Hand.

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ALSO COLD DRAWN SEAMLESS TOOL STEEL TUBING

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Dependable spark plugs mean—first, plugs whose reliability is *proven* daily; and second, plugs that are individually good.



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Reflex Spark Plug equipped White Truck in Intensive Industrial Work

On trucks, tractors and automobiles, Reflex Spark Plugs are giving the same reliable service they are delivering in war and industrial work in White Trucks. Try a set today. If your dealer can't supply you, write direct.

DEALERS: Inquire about your territory today. Get the details of Reflex Spark Plugs and Reflex Profits. Inquire how they must satisfy your customers as you are authorized to sell them on a money back guarantee.

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1711 Payne Avenue Cleveland, U. S. A.

Guaranteed for 10,000 Miles



EVERY Brictson Tire is sold under a specific 10,000 mile written service guarantee. This guarantee is the longest and strongest ever put behind a pneumatic tire and is a positive protection to every purchaser.

"Absolutely Puncture Proof"

Brictson Tires are puncture proof, and proof against blowouts, skidding, rut wear, rim cuts, and can't be damaged by oil or gasoline. Wonderful resiliency, easy riding qualities as well as economy commend them to every car owner.

The Big One-fourth Retread Feature

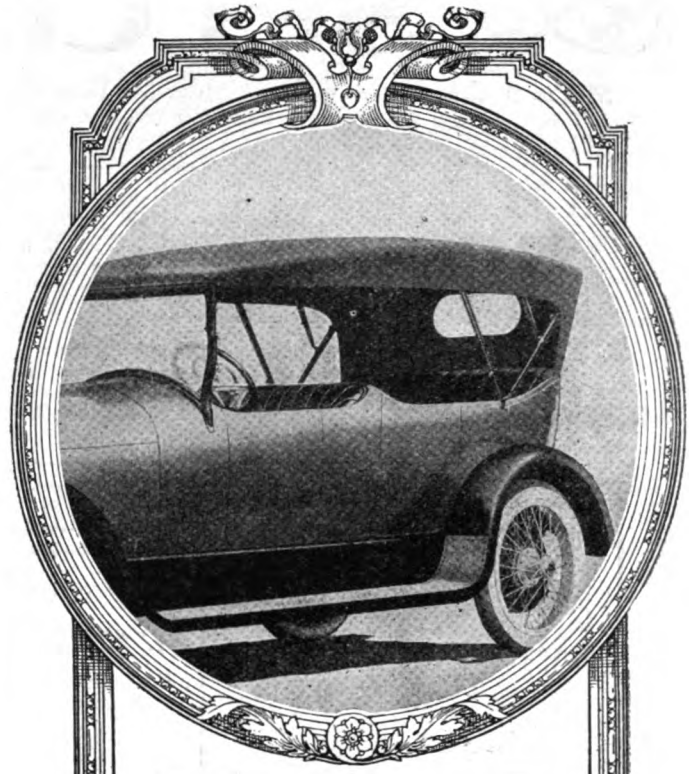
Should the tread surface wear out after 10,000 miles of service you can get a new retread for one-fourth the original cost of the tire, instead of buying a new tire, and you keep the remaining three-fourths in your pocket. With ordinary service the Brictson Tire should run enough beyond the 10,000 miles to require one or two extra retreads. The more retreads you use the cheaper your service.

FREE TRIAL OFFER

To convince you the Brictson Tire will give satisfaction TRY THEM ON YOUR CAR AT OUR EXPENSE. Write today for this Free Trial Offer, a copy of our guarantee and full information about Brictson Tires.

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1015-24 Woodmen of the World Building
OMAHA, NEBRASKA

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"Defies Time and the Elements"

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DREDNAUT Motor Topping

RE-TOPPING DAYS

NEVER before was retopping so popular—Motorists everywhere are economizing and repairing their old cars.

For real beauty in top materials, for real worth throughout, we have Chase Drednaut Motor Topping—a waterproof, sturdy fabric backed by the "Chase" trademark.

Don't experiment with mere top materials—get Chase Drednaut and and make sure.

It will make friends every time.

Write us your requirements, and samples will be sent at once.

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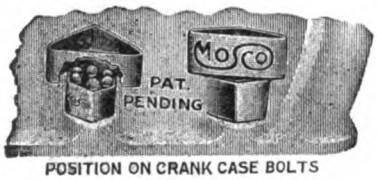
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MOSCO SPECIALTIES

Mosco Socket Nut and Bolt Holder for Ford Car

A REAL TIME SAVING DEVICE. Takes the place of that other man whose help is usually required for this operation.

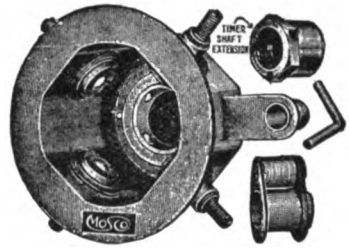
Simply slip MOSCO Nut and Bolt Holder over the top of each engine or Transmission nut or bolt head, the wings protruding above the hex socket engage wall of crank or transmission case and prevent nut or bolt head from turning while the man underneath the car unscrews the bolts. When replacing put head of bolt on top, slip on the MOSCO socket and proceed as in taking out. Made of heavy pressed steel, with reinforced wings welded to body of socket. All case hardened and finished bright.



POSITION ON CRANK CASE BOLTS

Price 15c Each.

Improved Bemus Ball Contact Timer for Ford Car



Cheapest in the long run.
All wearing parts renewed at cost of 27c.
Easier Starting.
Grease Cannot Prevent Contact.
Unbreakable Heavy Steel Shell.
Smoother Running.
Contact is Positive.
Longer Life.
No Fibre Ring to Wear Humpy.

Price $2.25.

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WHY USE SHELLAC?



When You Can Obtain Far Better Results With

Permatex Gasket Cement

Produces a pressure-tight union that is gasoline, kerosene, oil and water proof and has a heat resistance five times that of shellac.

If Your Jobber Cannot Supply You, Order Direct

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2-oz. Swab Bottles, 20c each ¼-pt. Cans, 30c each 1-pt. Cans, 90c each
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Entirely re-written, hundreds of illustrations and many new subjects added. Practically a new book. A non-technical treatise with simplified illustrations on Constructions, Operation, Repairs and Adjustments, Cares and Troubles of the Automobile.

There are 50 Instructions—Simplified and practical.

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TRUCKS, TRACTORS, MOTORCYCLES, AIRPLANES AND AIRPLANE ENGINES.

Price $3.82, Prepaid, Express.

How to Become an Expert Automobile Mechanician

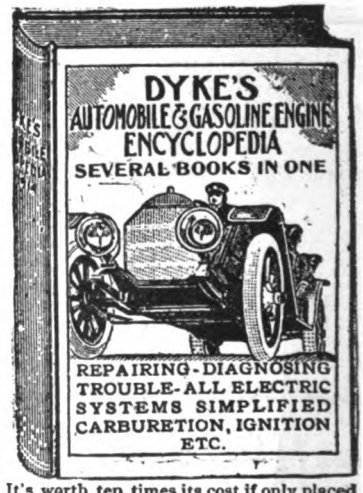
The quickest and cheapest, but BEST way, is by studying Dyke's Automobile and Gasoline Engine Encyclopedia.

It is a practical, simplified instruction on everything you want to know and OUGHT to know about motoring.

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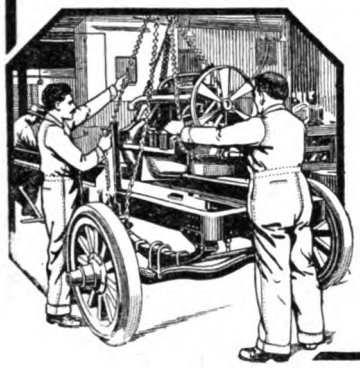


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IRONCLAD KHAKI
(TWILL CLOTH)

You men and women on the "firing lines" of industry should wear garments of this patriotic economy cloth, too.
It's fast color and *wears like leather.*

Coveralls, Overalls, Shirts and Pants
made of the genuine IRONCLAD KHAKI (the kind Uncle Sam uses) carry the yellow "Army label" like the above. LOOK for it and the Guarantee Bond in the garments before you buy.

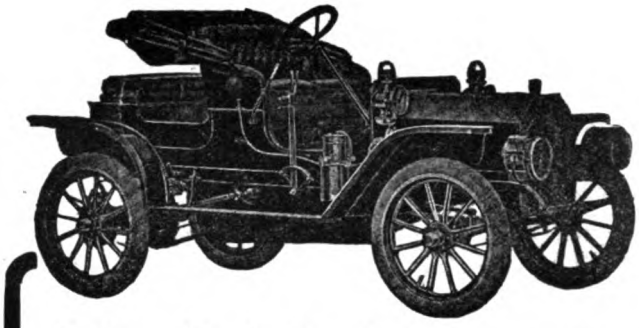


See for yourself what Ironclad Khaki and Miss Ironclad Khaki, the special woman's overall cloth, look like. Write today for free samples.

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We are makers of the cloth only

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132 Market Place, Baltimore, Md.



A Free Book for Auto Repair Men

The **Auto Repairers' Guide & Price Maker** is issued in the interest of automobile repairers, dealers and garage men—**it's free to the trade** and sent to them only.

Think of it, **512 pages of bargains**—about 3000 illustrations—a complete auto repairers' guide and price maker—quotes **lowest wholesale prices on** first quality automobile supplies, auto repairers' tools, tool kits, spark plugs, horns, lamps, pumps, springs, forgings, brass fittings, batteries, coils, switches, auto tops, Ford Specialties, and in fact **everything used on an auto.**

Write for your copy today, sending business card, letterhead or some other evidence that you are in the trade.

CRAY BROTHERS
JOBBERS AND MANUFACTURERS OF AUTO ACCESSORIES
1119-1123 W. 11th St., Cleveland, Ohio

"HEXALL" RATCHET WRENCH No. 1

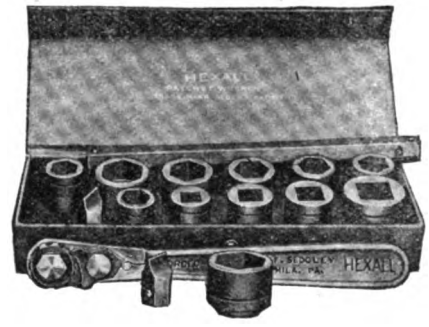
Complete Set

The man who keeps the "I have it" store shows Sedgley Wrenches in his store window—customers that BUY do the rest.

Contains 7 inch, Steel Forged, Ratchet Handle; 2 Screw Driver Bits; 7 inch Extension Bar; 8 Hexagon Sockets; 4 Square Sockets. Packed in neat, strong cloth case. Weight, 35 ounces.

Ask Your Jobber

"Break any Sedgley Wrench and we repair it—no charge"



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NO CARBON - MORE POWER - LESS FUEL



POPULAR SIZES 50c.
Gives Results No Other Ring Can
Guaranteed Satisfactory, or Money Back
Write for free booklet A-2. Sold by leading jobbers

BULLETIN NO. 1.—SERVICE

We are interested in, and backed by, the largest piston-ring plant in the world, who make nothing but piston rings. Therefore, we are in a position to fill large as well as small orders promptly.

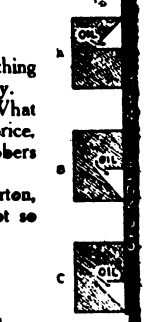
"NO-LEAK-O" rings are sold on their merits rather than through glaring advertising. What we save in advertising we give to our customers. That's why they are sold at a popular price.

We advertise moderately. We circularize garages and repair shops, enclosing list of jobbers and dealers carrying a stock. We furnish literature, posters, blotters, etc.

All genuine "NO-LEAK-O" rings are wrapped in oil paper, packed one dozen to each carton, bearing our trade-marks—"NO-LEAK-O" and the "SEAL IN THE RING." Rings not so packed and marked are not Genuine "NO-LEAK-O" rings.

We absolutely guarantee each ring for quality, accuracy and satisfactory service.

Look Out for Bulletin No. 2



"NO-LEAK-O" PISTON RING CO.
AUTOMOBILE ACCESSORIES CO.

Sole Manufacturers **824 W. North Ave., Baltimore, Md.**

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Presto Electric Heater

Attaches to Any Electric Light Socket



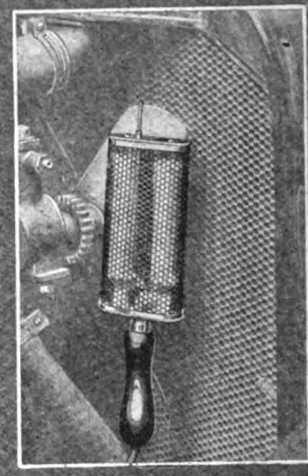
HAS two new conveniences: The swivel hook, which permits the suspension of the heater anywhere under the automobile hood; and the handle, which allows moving it from place to place while still hot.

A big money and trouble saver for motorists. Keeps the engine and carburetor warm in the coldest garage. Prevents freezing, cracked cylinders, or burst pipes. Avoids unnecessary worry, repair expense and lost use of car. Keeps the engine warm and easy to start on cold mornings.

All leading jobbers and dealers sell the Presto line of

DASH LAMPS SWITCHES
INSPECTION LAMPS CONNECTORS
ELECTRIC CIGAR LIGHTERS, ETC.

Write for Complete Catalog of 100 Real Live Accessories

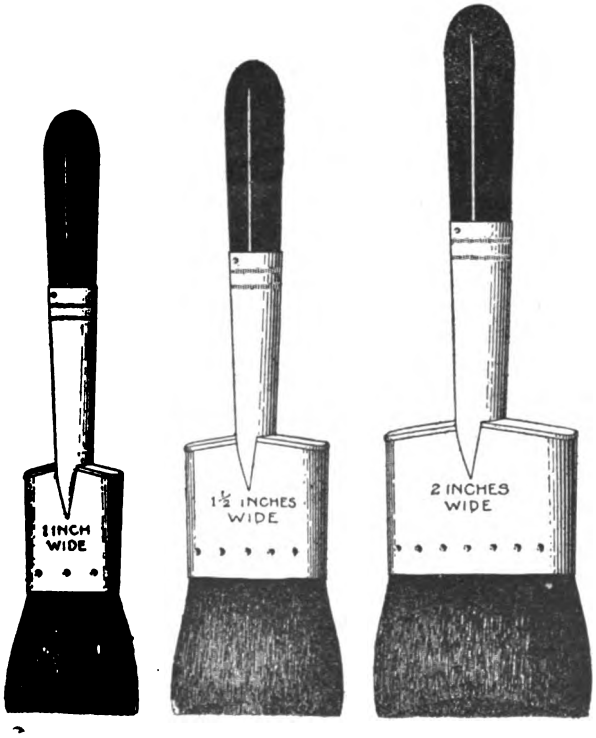


PRICE COMPLETE with 10 Feet of Cord and Plug
$4.00 U. S. A., $5.00 Canada

Metal Specialties Mfg. Company, 338-52 N. Kedzie Ave., Chicago
EASTERN BRANCH—16-24 W. 61st St., New York WESTERN BRANCH—149 New Montgomery St., San Francisco

IMPORTANT POINTS ABOUT PAINT AND VARNISH BRUSHES

A Set of Three Brushes and the Automobile Dealer and Repairer for One Year for $2.00



Brushes Needed in Repainting and Varnishing an Automobile.

Did it ever occur to you that there was much difference between a good paint or varnish brush and a poor one? Probably not. To most people a brush is just a brush. Yet an analysis shows that there is an almost measureless difference between a good brush and poor one.

For instance, a properly made Flowing Fitch brush is hermetically sealed, so as to keep the paint, or whatever may be used, from getting into the brush at the top and loosening the hairs. All such properly made brushes are solidly set in glue cement inside a leak-proof ferrule, and a whole row of neatly clinched nails are driven in at the end of the ferrule to give added security, and a guarantee that the hairs will not pull out.

A Fitch brush is *smooth, soft,* and *flowing,* and does not "mush" up or get flabby like a cheap brush, but holds its springiness. The trouble with cheap brushes is that the ferrule is nothing more than a single band of tin, open at the top, with a couple of nails jabbed through. When you use such a brush the cheap hair will pull out and scatter all over your work, because it is not held in securely enough to stand the drag of the brush in painting or varnishing.

A brush may be washed with gasoline or kerosene oil, but to clean it thoroughly turpentine should be used. No brush used for painting should be used for varnishing.

We have recently made arrangements with one of the best manufacturers of these properly made brushes in New York to offer a set of Three in connection with a subscription to the AUTOMOBILE DEALER AND REPAIRER for a year for an even $2.00. These brushes sell at retail for $1.40. It will be seen, therefore, that there is a substantial advantage in sending to us for the AUTOMOBILE DEALER AND REPAIRER for a year, and for a set of these brushes.

Present subscribers can have their subscriptions extended for a year, and secure a set of brushes, on the same terms. These brushes are guaranteed in every respect, and though they cost more than cheap brushes would cost, they are far cheaper in the end, because of their lasting qualities and the good work that can be done with them. No man can afford to waste expensive paint and varnish on an automobile by using a cheap and poorly constructed brush, such as is usually to be found wherever brushes are sold. The ordinary dealer in brushes himself as a rule has very little knowledge of the quality of the brushes he sells.

Remit by check or money-order, and your name will be entered as a subscriber to the AUTOMOBILE DEALER AND REPAIRER for a year, and a set of these brushes, which are just the right size and shape (see illustration, which is exactly one-half the actual size of the brushes,) will be sent to you, postage prepaid.

Address all orders to the

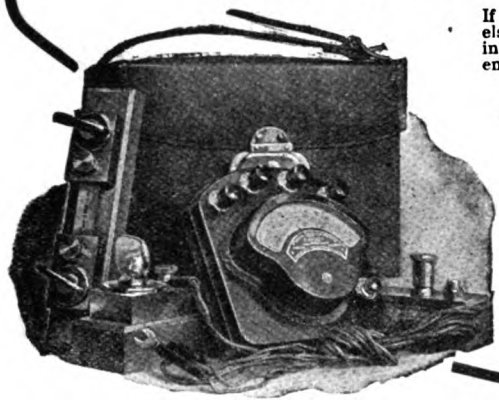
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Electrical Repairs Bring the Big Profits!



If you cannot repair electric starting and lighting equipment intelligently, your customer will go elsewhere for this service. He will take the rest of his trade with him. There is more money in electrical repairs than in any other department of the garage business. The demand is enormously increasing.

Weston Model 280 **GARAGE TESTING INSTRUMENT**

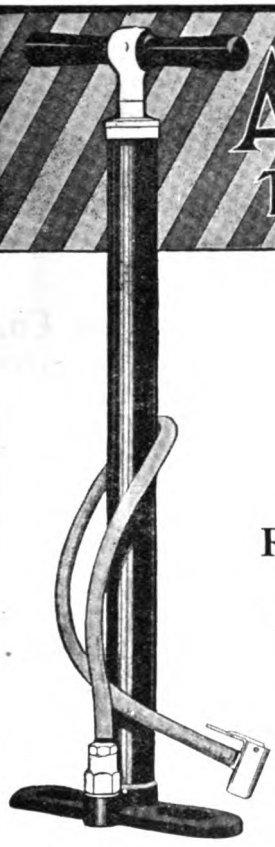
is the best, the most reliable and therefore the cheapest electrical equipment for you. It enables you to determine promptly and accurately the condition of the electrical equipment of any automobile, just where the trouble is and just how to remedy it.

Write for our *Special Proposition.*

Weston Electrical Instrument Co., 2 Weston Ave., Newark, N. J.

23 Branch Offices in the Larger Cities.

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SIMPLE
POWERFUL
EFFICIENT

A
REMARKABLE
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EXAMINE IT
AND YOU WILL
BUY IT

The Anthony Company, Long Island City, New York



Exceptionally Large Profits can be made by Repair and Garage Men with

No. 8 Lowell Adjustable Sectional Vulcanizer

It's different, superior, economical in operation, in fact beyond comparison.

Complete and thorough work can be accomplished with this vulcanizer at all times.

DON'T LOSE A MINUTE—WRITE TODAY!

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This new idea in Patch construction eliminates every possibility of an imperfect tube repair—and the man who looks at an idea to see if he can use it, and not to see if he can get along without it, is the man who wins out every time.

This Patch is Guaranteed Not to Loosen, Leak, Creep or Blow Out. Absolute Satisfaction or Money Refunded

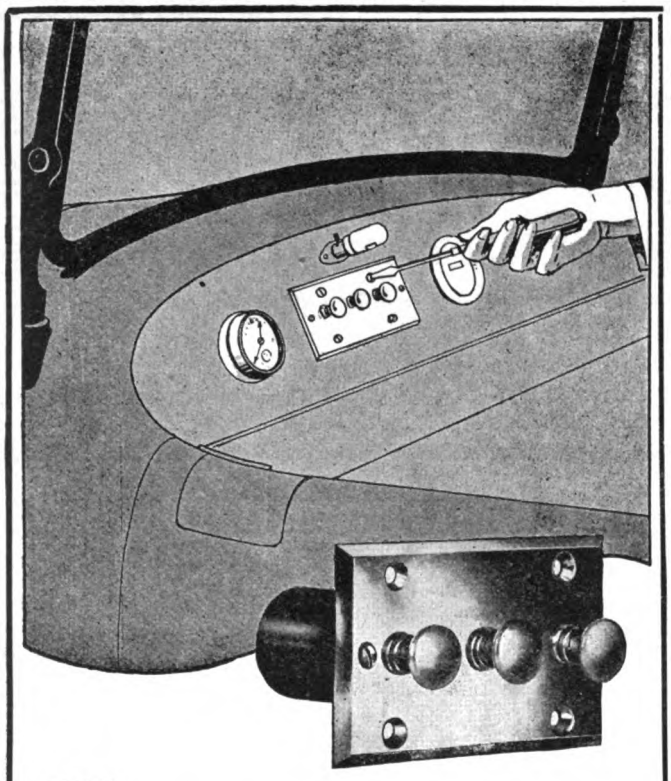
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Products are noted for the Simple Practicability with which they Perform their Functions

The switch illustrated above is a "3-gang" type N Lighting Switch.

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Famous Five-Minute Cure Cement

WILL CURE IN FIVE MINUTES

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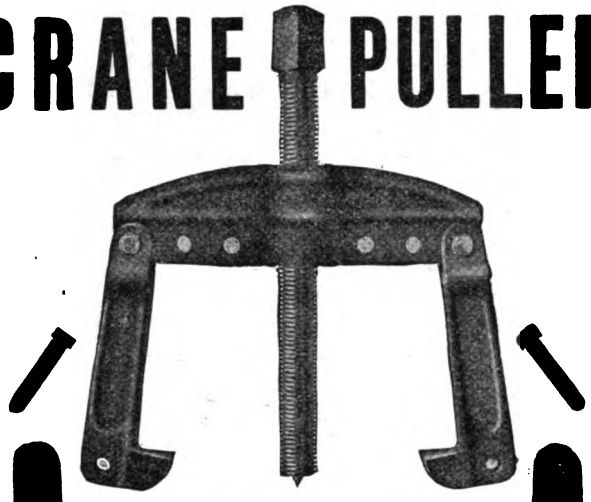
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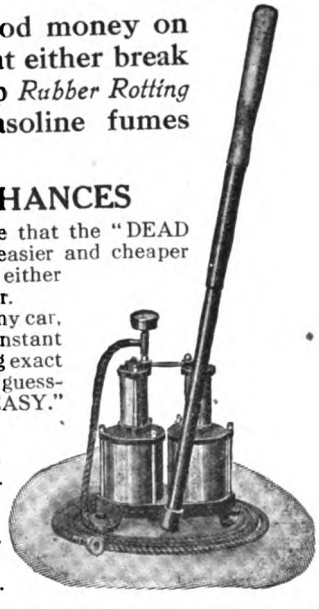
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The Blows That Your Tires Receive, When You Strike Objects in the Road, Leave Weakened Places in the Fabric

A TIRE IS AS STRONG AS ITS WEAKEST POINT

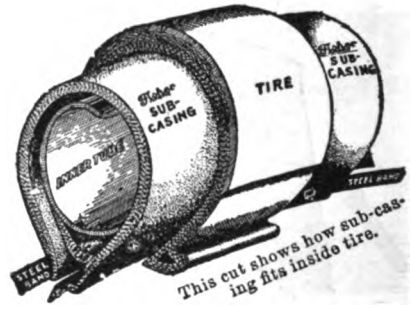
The weakened places are hard to detect now, but will result in blow-outs later.

RIM-GRIP SUB-CASINGS reinforce the fabric of the tire at all points from bead to bead. They make a partially worn tire stronger than it ever was. It can be worn out completely and the sub-casing used in another tire. As the cost of equipping a car with new tires is much greater than last year, it will pay you to investigate Rim-Grip Sub-Casings.

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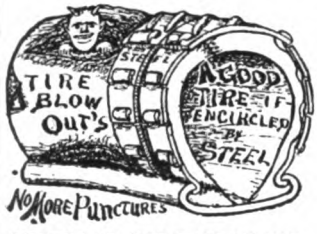
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This cut shows how sub-casing fits inside tire.

Hang on to your old tires. They will last as long as you live if covered with steel. **The Kimball Steel Protector** makes **Blowouts, Punctures** and **Rim Cuts impossible.** A few sections will hold any old blowout. Tires as flexible as ever.

Special inducements to those in new territory.







MUD CHAIN can be put on in a jiffy with one hand while standing on the run board. If you get in a mud hole you will laugh out loud. Hook the ends together and pull the little lever and they are on tight. Good for blowouts.

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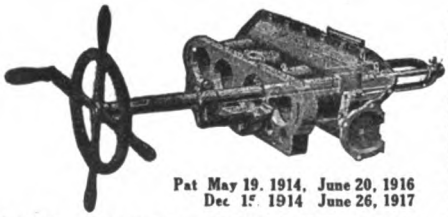
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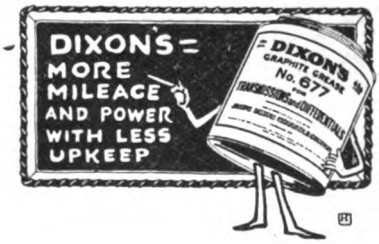
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Solve the Lubrication Problem

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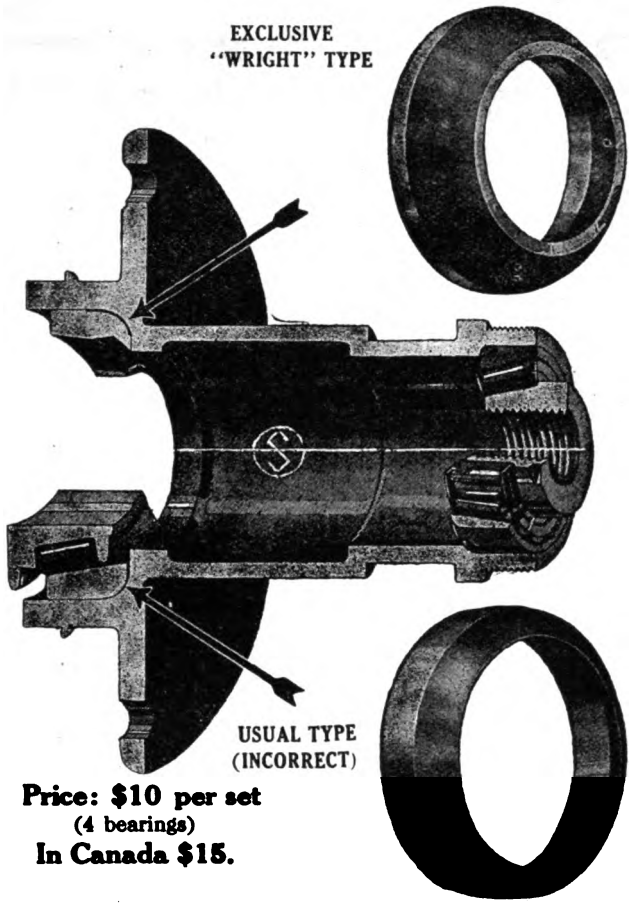
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Thus the Wright Bearing, which embodies the correct fundamental principles of bearing design, has added another exclusive feature to an already proven superior product.

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Wright Bearings are an Essential to Truck Units Using FORD or CHEVROLET

IF YOU WANT THE DEPENDABLE KIND OF
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That can be relied upon to be accurately machined, and of the highest grade material, to fit all makes cars,

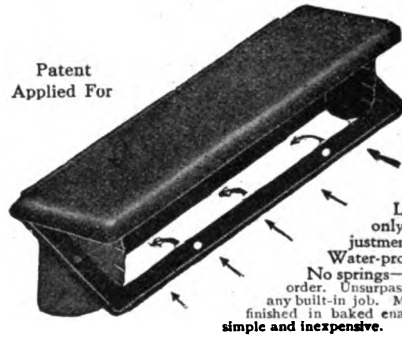
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For Ford Cars

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are positively guaranteed to hold air indefinitely without loss of pressure.

CAUTION

Do not confuse Scaife Copper-Brazed Tanks with the cheap Welded or Soft-Soldered Tanks made by others.

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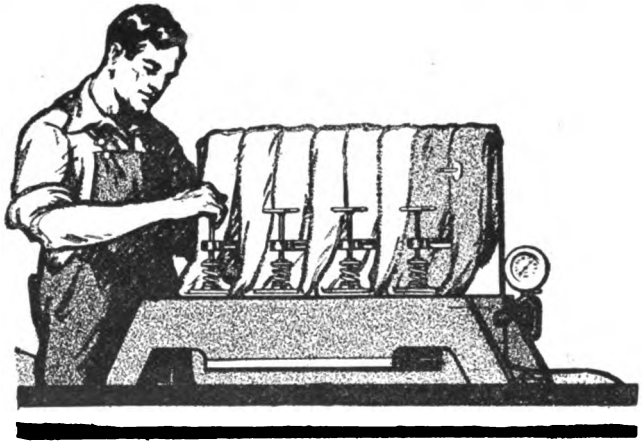
Dimensions given are outside diameter of hose. Send for Samples, Price List and Discounts.

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The Clark Electric-Steam Vulcanizer is Built for the Garage Man Who Wants Tire and Tube Repair Profits.

This outfit puts you in the vulcanizing business immediately—at lowest cost. No boiler to fire—no danger—simply hitch to your electric light socket. No current used when not working. Can be placed anywhere.



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Simplicity
Safety
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Easy to attach and detach



A size to fit every spoke—round or square

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It will pay you well to help us introduce the **Stokes Carburetor** to the public. You will find it to not only sell itself, giving you liberal commission, but it will make friends for you whose other repair work you get. It so markedly surpasses all other makes on the 5 vital points:—**Easy starting in zero weather; Flexibility; Power; Simplicity; Economy**—that it is becoming known everywhere, as ***"The Leading Carburetor."***

The price is **$15.00.** We guarantee that if within 15 days the purchaser finds it not satisfactory and as represented, he can return it and we will refund his money. ***Write for full particulars on Jobber's and Dealer's Proposition.***

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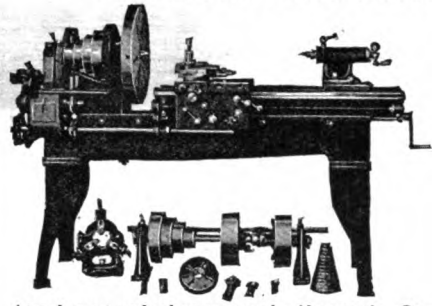
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Is our 14-24" Sliding Extension Gap Lathe
JUST THE THING FOR GARAGES AND REPAIR SHOPS



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Cuts right or left-hand threads, and can be furnished with transposing gears for millimeter threads.

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MOTORISTS have learned that a perfect strainer is an absolute necessity, and so thousands are sold every day.

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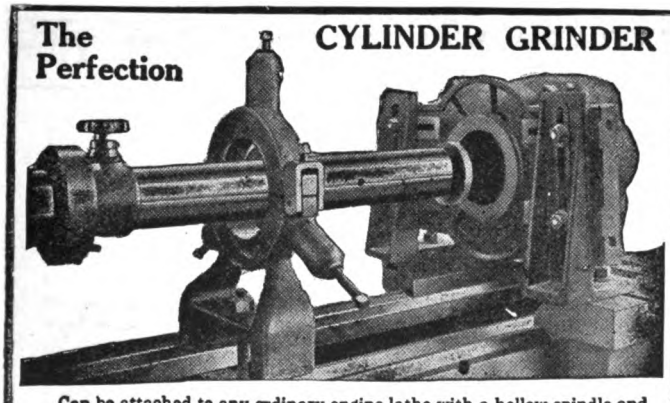
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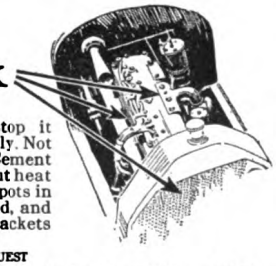
Can be attached to any ordinary engine lathe with a hollow spindle and a swing of fourteen inches or over. Descriptive literature on request.

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No Matter Where the Leak





SMOOTH-ON will stop it easily and permanently. Not a *gum* but an Iron Cement that is applied without heat direct to the leaky spots in radiator and manifold, and on cracked water jackets and pumps etc.

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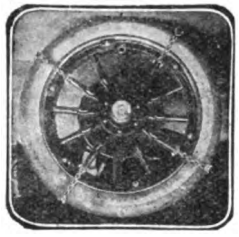
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EASYON CHAINS

$3.00 to $5.00 per Set.

Only THREE Sizes To Stock!



Half the weight—
Half the bulk—
Twice the usefulness.

They "Grip Like Mud Hooks"
They "Ride Like Bare Tires"

EASYON Chains can be attached ***instantly,*** whether in deep mud or on smooth pavement. No jacking up the car—no moving the wheels. Just drop them over the tires—then snap, snap, and it's done. EASYON Chains can be attached easiest, quickest, surest, —by man, woman, or child.

You can get EASYON CHAINS NOW—At Once. This is a fact that both owner and dealer appreciate.

EASYON TRUCK Chains—made for TRUCKS as EASYON Chains are for passenger cars. Invaluable to the truck driver—will help him out of many a hole. No truck should start out without a set in the tool box.

You Can Sell EASYON Chains and Make A Good Profit.

Write for information and trade discounts at once. EASYON CHAIN weather is rapidly approaching and you want to be fully prepared. Don't delay.

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Made for all Makes and Models.
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A Journal of Practical Motoring

Registered in the U. S. Patent Office

VOL. XXVI. No. 2. NEW YORK, OCTOBER, 1918. PRICE {10c. PER COPY $1.00 PER YEAR

The Undertaker and the Graveyard

The Post Mortem of the Sick Car Series. It Deals With Live Cars Resurrected from Dead Remains.

WHEN I started the "Sick Car" series in July, I did not expect to let any of the patients die on my hands. At the time I did not think of the "Undertaker and the Graveyard," but death is one of the surest things that overtakes us, and naturally some of the patients are bound to turn their toes, or, better still, their wheels upward—and it is not to be expected that they will continue to exist forever.

I had counted on a somewhat different story than the one that this is to be, and had written to a number of manufacturers for details and data which would help me out, but one and all of these manufacturers overlooked the point of my story, to a certain extent, and wrote me that they did not care to be classed as "dead ones," or to have our readers feel that they were doing "graveyard business."

The American people as a rule are rather optimistic, and if we did not know that every one of those not living at present have at some time passed away, we would be inclined to feel that there was no such a thing as death.

There is one point on which the theme of my story differs from the general scheme of the life of human beings, and that is, the car undertaker is not always associated with machines whose days of usefulness are over. The car undertaker of today is the man who brings dead cars back to life again.

A Real Grafter.

If he does not bring the cars in their entirety back to life, he at least makes use of many of their parts. He is a "grafter" in the true sense of the word. He is more than a skillful surgeon in that he can graft crank shafts from dead cars into live cars. He will remove the heart, the lungs and the stomach from an automobile which has passed away and save it to be used in a car whose other organs are intact.

That is what I mean by "grafting," and if some car undertaker happens to read this article, I don't want him to think that I am casting a slur upon his business, because his office to the automobile and the automobile owner is that of a good Samaritan, and I have never yet heard of any used parts manufacturer who charged more for the parts than they are worth. As a matter of fact, I hardly see how many of these used parts may not make the business pay; the products are so cheap.

The automobile is not like the famous one-horse shay of historic fame. It does not drop to pieces or wear out all at once. Some automobiles last longer than others, and, following the same argument, some parts of some automobiles wear longer than others. It would be perfectly possible then to disinter an automobile that had been put away in the back of a garage, and find some part of it that could be used again.

For instance, suppose you were able to make a collection of two or three dozen old Ford cars that had been thrown into the junkyard. You would probably find that all of the frames, springs and casings were in good condition. You might be able to salvage two front wheels and fittings from the lot. You might be able to pick up one rear axle with which the replacement of three or four gears would give as much service as a new one.

A Composite Machine.

The engine itself might require considerable overhauling. The crank case, transmission cones and connecting rods, together with the pistons, the cylinder head and the crank shaft of at least one of the cars could be used

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again. It only remains for you to salvage all of the parts which are in the best condition and put them into a composite machine.

I once heard of a garage man in a large city who decided to build an automobile out of the machines coming into his shop without putting in money upon it beyond that of paying junk prices. Within six months he was able to put on the road a car in running condition, his only cost was that of certain new bronze bushings for various bearings.

He followed a system of substitution which worked out something as follows: When a car owner brought his machine into the shop for the replacement of certain bearings, the garage man removed the old part and put in a new one, charging the cost to the owner.

The old part he examined carefully and entered upon a chart which he kept in the office. If he had already a part like it, he junked the worst of the two and kept the best one. As he was also a dealer and agent for Ford cars, he was able to pick up many old cars at junk prices. These cars he pulled to pieces, putting all of the iron in one pile, the bronze in another, the aluminum in another and the steel in a fourth, thus doing the work that the junk man does, and selling the metal at a higher price than ordinarily could be obtained for a completely assembled junk car. He saved only those parts which he needed and which might be used again.

Visit the Junk Yards.

If the reader is interested in obtaining an automobile without paying a new price for one, he should adopt somewhat the same procedure. I think I am right in saying that in every city throughout the country there is at least one junk man who makes a practice of buying second-hand cars, and with a little judicious buying anyone who likes to utilize their spare time working upon machinery can collect enough parts from which to build a machine, which may not compete with a Rolls-Royce or a "Fierce Sparrow," but it will "puff" them around the streets of their town and possibly attract considerable attention.

I know that the machine which I constructed in a similar manner was always the center of a group of people. I will not say that the audience was an admiring one, in all cases, however. Quite frequently the machine was the center of an enthusiastic group of youngsters who looked upon it rather the same as they did upon the "Packard Twin Six" which one of their playmates had constructed from a pair of baby-carriage wheels, an old soap box and parts of their big brother's bicycle.

Notwithstanding the handicap of appearance, the car which I have reference to had enough power to carry it up any grade that I ever encountered, and I have reason to believe that the person who purchased it from me put the same faith in it that I did. At any rate, he made an attempt one day to go up a telegraph pole which presented a 100 per cent. grade. The machine might have done this had it been properly equipped. As it was, however, either because of poor driving, or because of some inherent defect in design, it failed to negotiate the grade properly and so went to its doom.

In another portion of this magazine is the second instalment of the article relative to salvaging an old car, and so I will not take up in detail any particular machine, but give a few general suggestions which are applicable to many machines now on the market or which are out of the market because of their age.

Various Important Units.

Let us take up in detail the various parts which go to make up an automobile. First, the engine, and this is the most important unit. One may well say that the life of an engine depends directly upon its cylinders and its valve seats. Let me explain.

No matter how deeply scored or how badly worn an engine cylinder is, there are ways and means by which certain repairs can be made, providing there is enough metal left in the cylinder walls. The cylinders may be rebored or reground, if they are out of round, and if they are perfectly true, the scores may be plated or filled with a welding compound, thus restoring their value. Still, if the valve seats have been worn through or if the valves cannot be ground any further into the seats, then the cylinder block has ended its days of usefulness.

Don't attempt to grind the valves in an old engine block if the tops of the valves are more than 1/16 of an inch below the surface of the valve seats. Even though you may be able to obtain a tight joint at the valves, there will be a great loss of power because the valves will not permit a large enough opening for either the intake or the exhaust gases.

There is another point that I want to caution you against, and that is not to rebore the cylinders of an engine more than twice. Of course there may be exceptions to this rule, but a good mechanic can usually tell whether the cylinder walls have been cut too thin or not. Provided the cylinders and valves are in condition, one can always repair the block. If the water jackets are cracked they can be welded. If the cracks are small, however, the welding process is entirely unnecessary in many cases.

Repairing Water Jackets.

Let me tell you how you can repair small cracks in the water jacket. Remove the cylinder block from the engine and plug the water outlets. Then fill the water jacket with a concentrated solution of copper sulphate and water. Copper sulphate, which is often termed "blue vitriol," contains a high percentage of copper, and when the jackets are filled with this solution, copper immediately deposits upon all of the clean surfaces.

The solution at first will leak through the crack and so a basin should be put beneath it to catch the liquid. After the liquid has been poured into the cylinder three or four times, the leak will grow smaller, until finally

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the crack is filled. I have seen some very large cracks mended in this way, but do not expect to have good luck in every case. Still the cost of the treatment is so far below that of welding that it always pays to try the experiment.

Pistons and connecting rods last almost as long as the car. The wrist pins or pistons can be bushed to fit their respective bearings, and the connecting rods may be repaired as directed in the article by W. O. Mann. Crank shafts can be turned by a machinist so that they will give much service unless they are badly damaged. Of course old gears which are badly worn should be replaced with new, as must also pump bearings or certain other parts.

A word to the car owner who is not familiar with the various machines now in use: At the present time there are at least fifty different makes of engines and cars in active service, so that even though the wreck which you have come into possession of is a so-called "orphan," you may be able to replace certain parts with new parts obtained from one of the active manufacturers.

Where to Buy Parts.

Suppose, for instance, you are obliged to replace a connecting rod. Visit all of the car agencies in your town and see if one of them does not use the same size connecting rod that you wish. Possibly one connecting rod that you may obtain will be identical with yours except that the holder for the wrist pin is too large. All you need to do then is to use a larger wrist pin bushing.

The same thing is true of valves, valve springs, tappets, timing gears, starting crank ratchet (a part of which wears very fast), flywheels and even gaskets. If the car which you have is fitted with a standard engine such as a Continental or a Budda, you need only to consult a list of car specifications to find upon which machine this engine is being used and obtain the parts from the salesman of that particular car.

Electrical apparatus is fairly well standardized. Once you know the name of the manufacturer of the electrical apparatus on your car, you can obtain supply parts from the agent who carries a car equipped with similar apparatus. Do not feel that you need to have all of the parts made at the nearest machine shop, for you do not. Visit the nearest junkyard and spend a few minutes hunting around. The result will often surprise you.

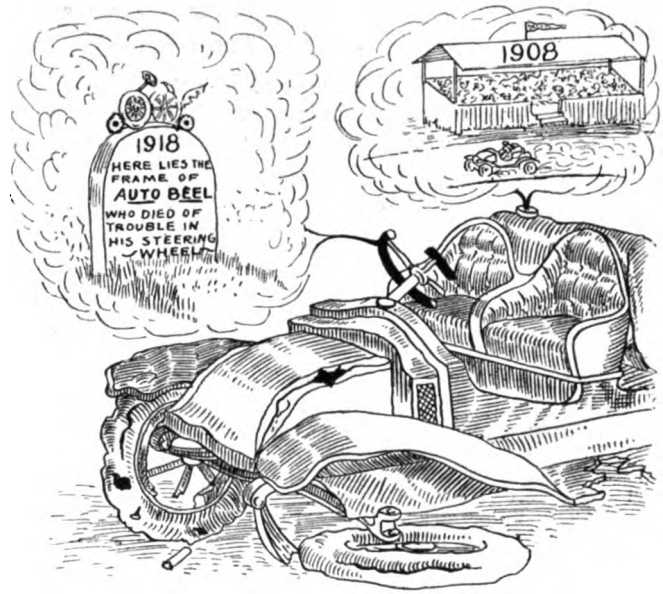
I remember when I put my car together I spent about three days in a junkyard hunting around for most anything that would answer the purpose. I carried home in the neighborhood of 200 pounds of junk iron, steel, copper, wood and aluminum, and I frequently received many surprises after I had arrived at home with my purchases.

The greatest trouble I had was matching springs. In one pile at the junkyard I picked at least a dozen springs (or parts to a dozen springs), for in every case at least one leaf was broken. I spent two hours hunting through the pile and finally, after hauling over at least two tons of rusty iron, I located three-fourths of a set and a single leaf for a fourth spring.

I spent two days at a later date trying to match up this fourth spring and never succeeded. My car was fitted with three springs of the same make and one of another. It looked all right if you viewed it from a three-quarter angle.

The Eye Is Fooled Easily.

There is another surprise that one is apt to get in looking for the remains in a junkyard, and that is the deceptiveness in sizes of certain parts. I had my car nearly complete before I decided that it needed a steering gear, and so I hastened to the yard in hopes that I might find such a device. I was not disappointed. I found them there in every stage of repair, but as I looked them over I noted that the wheels all seemed to be very small. I picked out the largest that I could find, and



Dreaming of Days Past and to Come.

when I got it home I bushed the wheel and put it in place.

Not until then did I measure it and discover, much to my chagrin, that whereas the old car had been fitted with a twelve-inch wheel, the one I was putting in place measured a good eighteen inches. I had the seat in place and unless I wanted to rip the whole thing out there was no way of changing the design. The wheel was almost as large as the car, and in driving I always carried it in my lap. The only way that one could "get out from under" it comfortably was to crawl over the back of the seat, and for a time I contemplated the fitting of an iron ladder from the ground, in the rear, to the top of the seat.

It was then that I realized how deceptive measurements can be. The extremely small wheels which I had noticed were really large enough, and only appeared

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small because an automobile was not near, with which to compare them.

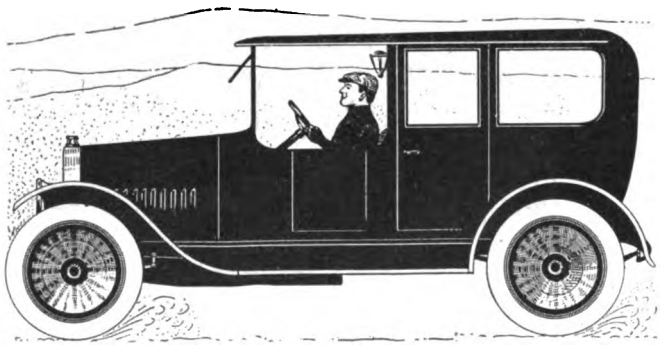
Transmission parts are easy to obtain because so many parts are standardized. If one is fortunate enough to obtain an old transmission of popular make, then new parts cost but little in comparison. Always bear in mind that perhaps there is a car on the market which is equipped with the same transmission or a similar one to that which you are using.

The same thing is true of rear axle parts. Once you have the housing, the gears and the bearings are easy to obtain.

Anchor the Gear-Set Firmly.

The transmission gear-set which I used was of peculiar construction and unlike anything I had seen up to the time I built the machine, nor have I seen one like it since then. As I remember it, it was made as an experiment. It was of the planetary type and shaped very much like an elongated egg. The front was designed to connect with the engine, the rear to the propeller shaft, and except for two or three bolts in the side there was no way by which the thing could be fastened to the frame.

Not realizing that a gear-set must have some point of anchorage, I connected it properly, but failed to fasten it to the frame. The first time I started the engine and threw in the low speed forward gears, this transmission did a "Highland Fling" and nearly wrecked the floor of the machine. It turned completely over and twisted



You Can't Build a Classy Touring Car, But You Can Get Around the Country in It.

off the control rods before I could stop the engine. Finally I managed to anchor the transmission to cross members made from pipe fittings, which gave entire satisfaction until one day in ascending a hill one of the lengths of the pipe twisted off. This trouble was remedied by the use of hydraulic pipe rather than an ordinary iron pipe.

The ingenious "undertaker" can easily surmount every difficulty presented, if he bears in mind that there is a fitting made for about everything one desires. Iron pipe or tubing can be used for various fittings and combinations of the two can be made to answer every purpose. Iron pipe is measured from the *inside,* while tubing is measured from the *outside.* Thus a piece of two-inch tubing will slip into the hole in a two-inch length of iron pipe. For odd sizes one can use hydraulic pipe.

It is always easy to give advice when one has had experience. The body of the machine which I built had as its foundation an old door, but it might have been made much lighter if it had been built of joist with sheet iron panels. Although doors and hoods, as well as the backs of seats, are seemingly hard to construct, the amateur will find that the bending of sheet iron into proper shapes is an easy matter. A heavy mallet and a piece of iron to pound upon can be used to shape panels and doors to good advantage.

Bolt the Body Firmly.

Never make the mistake in thinking that an automobile body need only be rested upon the frame. It must be bolted (with a capital B) or the car will run away and leave the body in the road, sometime or other. The operator in a case of this sort usually has to make a quick decision as to whether he will stay with the machine or the body, and frequently he changes his mind after having stayed with the machine for a few minutes. and so I caution you again to bolt the body firmly to the frame.

If the machine is of the old type and is not fitted with an up-to-date ignition apparatus, by all means install a single unit system or a magneto. You can obtain a magneto second-hand at surprisingly low cost. You may not be able to fit a starting and lighting system on the old model, but you can equip it with a generator.

Generators, as they are being made at present, are exceedingly long lived. I think I am safe in saying that an ordinary generator will wear out two cars, sometimes more. You can drive the generator by a belt from the flywheel or by a chain from the timing gears or the fan pulley. The latter gives the most satisfaction.

I used an old acetylene generator and a single large headlight for a time, but the only time the generator gave satisfaction was from sun-up until sun-down. During the evening it seldom generated any gas for the light, so I managed to obtain a large generator which kept the storage battery charged and gave enough current for a very large spotlight, though it was not called a spotlight at that time. Spotlights had not come into existence. With the generator and storage battery I was always sure that I could obtain sufficient current for the ignition system, something that I had not been sure of before, while I was using dry batteries.

The Undertakers.

At the present time there are many manufacturers who make a business of putting out new parts for old cars. They call these "orphan parts manufacturers." They buy the patterns from the car manufacturers who have gone out of business and from these they make parts to fill the demand for owners who have purchased cars no longer manufactured. From these manufacturers one

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can obtain parts for practically any make of car ever built.

There is another class of men who make a business of tearing cars to pieces and salvaging the useful parts. These men I always refer to as "undertakers," and both of these business houses lend their able assistance in brnging to life cars which seemingly breathed their last and may be classed among the "dead ones."

Foiling the Plans of Old Man Winter

When Winter and His Son Jack Frost Blow Upon Your Car a Shiver Runs Down Its Spine Unless You Keep It Warm.

BY W. L. ALMY

OLD FATHER WINTER may be a long time in getting there, but when he does arrive he certainly intends to pay you back for trying to crawl away with that old car you have in your garage. The old man has always conspired with new car manufacturers.

As soon as you buy a car the quality of gasoline

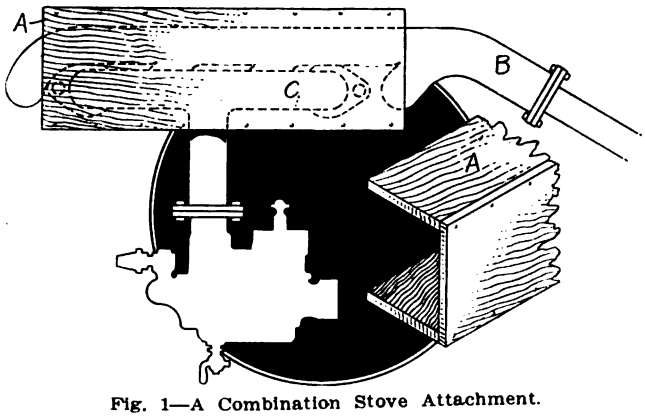


Fig. 1—A Combination Stove Attachment.

drops and you find that old man Winter certainly helps to blister your hands and keep your engine from running. Winter equipment for your old car is the one necessity that you can hurl towards old man Jack Frost. Don't let him keep his hands cool on your engine.

The gasoline of today is not what it was a few years ago, and when the chill of November and winter months strike it, it forgets how to vaporize. It shrivels up, so to speak, and contracts, like you do when you put your nose out of doors on a cold winter morning. You cannot expect your engine to work if you freeze the gasoline, and unless you keep the machine equipped with modern fittings you lose your bet with old man Winter.

He wins and you lose. You crank your car for a half hour in the morning just for exercise, then walk to the train, deciding that that is the cheapest any way.

In the first place let me tell you what an easy thing a gasoline engine is to start—if you know how. It is an old superstition that a horseshoe brings good luck, and I am going to verify the old superstition, which is just as good today as it was 100 years ago, but said horseshoe does not bring good luck if you leave it hanging over the garage door.

The next time your automobile balks in the morning, shoe it, and this is the way to do it:

Carefully remove the horseshoe from its old position over the door and heat it almost to a red heat in the furnace or over a gas stove. Gently seize it with a pair of pliers, not your fingers, by the way, though you will seldom make this mistake twice, and place it in its lucky position around the intake manifold just above the carburetor on your engine. Within five minutes you will find that the old superstition is a proved reality. Your engine will start and, shortly thereafter, run without a hitch. Don't forget to remove the lucky horseshoe from the manifold. It would not be seemly to leave your friend on the street. You may need it the next morning.

I have said that "the engine would run without a hitch," but in saying this I assume that you have carefully perused this article already and followed the rest of the suggestions which I outline. You would not expect to do good work if you had a severe cold in your head, yet under ordinary conditions you expect your

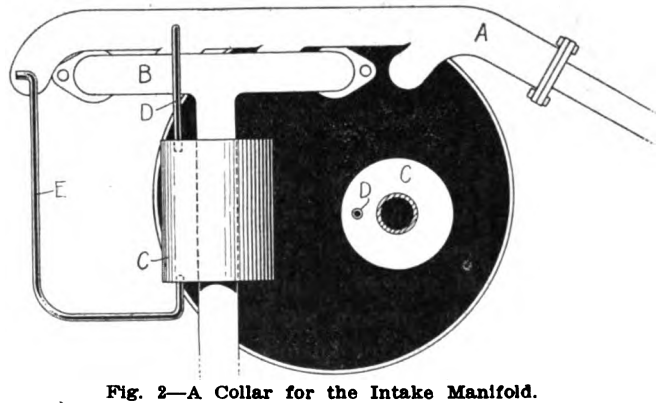


Fig. 2—A Collar for the Intake Manifold.

automobile engine to give satisfaction when you feed it with a draft of ice cold air.

You would not expect to go to work in the morning after eating a breakfast composed of cold food and ice water, yet is it not just what you ask of your engine? What is more, in reality you actually put a cold water bag on its stomach if you are not careful.

The first thing you want to do after you have read this article is to see that the air intake of your carburetor

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is fitted with a hot-air stove which connects to the exhaust manifold. Then have a tinsmith make up a sheet iron cover like the one shown in Figure 1 at A. This cover should be large enough to enclose the exhaust and intake manifolds. After it is in place it should be securely fastened so that it will not rattle.

If you follow this suggestion you will find that the hot air from the exhaust manifold B warms the intake manifold C, and that to a certain extent you make a combination manifold of the two. Should you be fortunate enough to own one of the popular cars known as a Ford you can purchase one of the combination manifolds, which can be obtained from any accessory dealer. There are many such manifolds made, and the full purpose of this device is to warm the gas passing into the engine by the exhaust gases.

Not all car owners can obtain such manifolds, because they are not made to fit all cars. Neither can the suggestion sketch in Figure 1 be followed in all cases. Where the engine is of a peculiar shape or other fittings are attached to the manifolds it is not always practical to cover them both with a hot-air stove. In Figure 2, however, is illustrated an idea which should prove practical in many cases.

At A and B are shown the exhaust and intake manifolds respectively. Around the "neck" of the intake manifold is placed a collar of heavy sheet iron. This should be riveted rather than soldered, and after it is in place it should be fitted with a cover at each end. The exhaust manifold should then be tapped for a quarter-inch pipe, and this pipe connected through a tube D with the collar C.

The lower end of the device should be connected with the tube E, which leads upward and away from the carburetor. This latter tube must be furnished or there will be danger that the exhaust gases will set the carburetor afire.

In the insert at C is shown a top view of the device with the exhaust fitting at D and a cross section of the manifold. The purpose of any hot-air fitting around the intake manifold is to vaporize the gas or to keep it in vaporized form. Otherwise the fuel will condense upon the manifold walls and the engine will not run smoothly.

Show Windows Are Very Important Factors

If You Allow the Spiders to Spin Webs and the Mice to Play in Your Show Windows, You are Discounting Your Biggest Asset

BY FRANKLIN MYERS

THIS is not the time for the retail store men to sink into innocuous disquietude—it is just the time to show real signs of life. Christmas is coming and it will be a more glorious Christmas than ever before.

Uncle Sam insists that we cut off all "fol-de-rols" and stick to the essentials; that our gifts this year be of the practical and useful sort, and in view of this fact, the retail dealer in auto supplies fits the breach like a new shell in the guns abroad. LICK THE BOCHE by keeping your business in the "going" class. Don't let the cobwebs and spiders accumulate on your shelves.

To sum up the present situation—most all cars, in these times, are used for business more than for pleasure—we know this. There would be no justification in allowing cars to lie idle because of improper equipment or lack of material. An idle machine is a sign of mismanagement as well as decadence, and we are far from that.

Now, Mr. Retailer, let's get down to business. It is time for you to make a decision as to what kind of a display you will have for your window this Christmas season.

Oh, yes, we know about that progressive euchre party, and then Thursday nights, that's the evening the bowling club meets—of course you've just got to see the latest big show—and we know all of your time is tied up with other extra special dates. Any time for business at all, or are you just kinder letting the other fellow, Mr. Competitor, run away with more than his share of the business?

"I'll get at it tomorrow"—but tomorrow, somehow or other, runs into next week, and the next, and the next and during this period of procrastination and delay, the other fellow—your competitor—is plugging—steadily plugging away on his Christmas window displays.

"Displays?"

Yes! He's going to make a change every two weeks—he's in with a good sign painter and every evening they get together and plan and scheme and work their brains so as to drag in all of the customers they can.

He hasn't any time for that "big show"—you don't see his name on the bowling team—No! For several nights lately, he has not put his head on the pillow until the "wee sma hours." But he intends to have a Christmas window with a change every two weeks, from now on.

"Too early?"

Not by a long shot, "the early bird catches the customers." Don't you begin to catch the Christmas spirit

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the minute you see the first Christmas show window? Don't you watch for them along about the first of November? You know the whole town talks about the first Christmas display that appears, and thinks that it's about the "best ever." Your competitor is going to be the "early bird" if you don't set your alarm clock ahead.

He's going to have a real show—something for the people to talk about, something for grandma, mother, dad, and the kids, to go crazy about. It's clever advertising and he knows the value of his window space. He's enthusiastic, tremendously so, about his windows all of the time, but particularly on all special occasions.

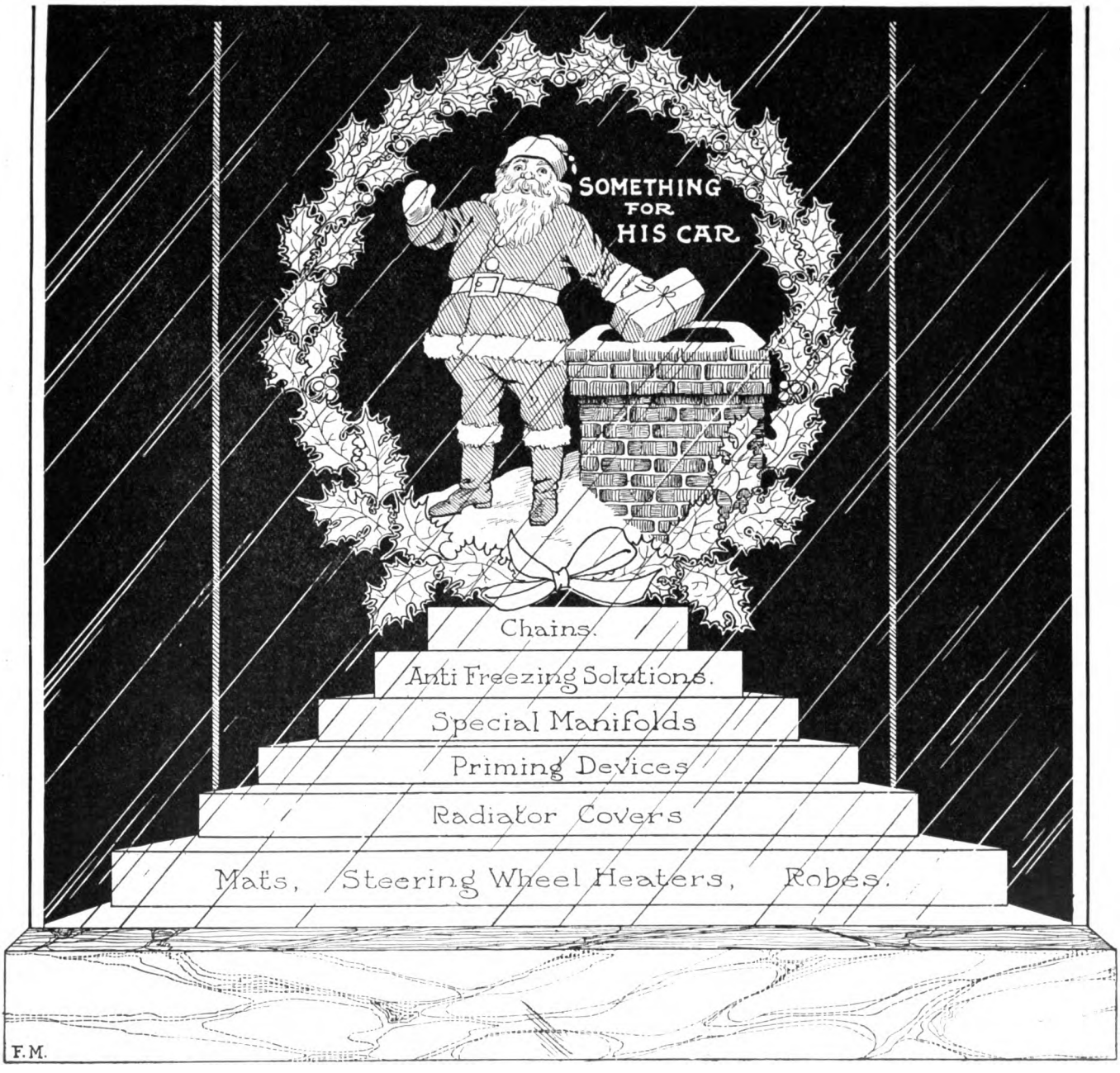
Sure he has his amusements and he goes to the "movies" too—BUT HE ATTENDS TO BUSINESS and once in a while he buckles down to good old fashioned (or better call it new fashioned) business ways, and collects the "coin."

No wonder he's got a handsome big car and a beautiful home. He likes nice things, BUT you can wager a mountain against a hillock that he worked for what he's got, and he's after your scalp, Mr. Bowler, as well as your customers—and by getting more customers he gets nearer to your scalp.

He knows you are out a great part of the time; that's just what makes him work all the harder. He's gaining on you in the business race. He heard you say that you "wouldn't work nights for anybody." That was his cue. Six months after he heard you say that he bought his fine big car and paid spot cash for it.

He heard you say that you "had all the trade in the neighborhood cinched." That very night Mr. Competitor put on more steam and decided he would pass you on the next lap and show you where you made a big mistake.

He started in right away to win the people by good



Any Up-To-Date Sign Painter Can Make the Background Design for This Window Display at Extremely Low Cost. An Attractive Window Is Always Worth the Investment.

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service, attractive window displays, quick deliveries, telephone service and special attention to the social end in the right way.

All he is thinking about now is how to beat you in a



Make a Number of These Window Display Cards.

Christmas window display. Personally, he wouldn't harm a hair of your head or listen to anyone run you down, but it's the business game that he's playing for all he's worth. He's diverting the stream of dollars from your cash register into his own—THAT'S ALL.

He saw you yesterday, going into the moving picture show and he walked right home to work on another good idea for a window display. He spent an hour on a circular letter to send his customers—to send to your customers too.

You see, you keep him going, he knows that he is taking advantage of your false moves, and he knows that you still think you have the "neighborhood cinched."

Every time he sees you going into a pool room or into the theatre he feels just like Uncle Sam when he received the peace note from Austria—he knows he's "got you going."

Every time he rings his cash register he says to himself: "Oh, my, but it's a shame to take the money!" Every time his cash register bell rings, it peals your "death knell."

"Mr. Bowler," the income that would accumulate from the advertising display that your windows hand out wouldn't keep a man in a decent furnished room. I know these facts to be true. I've traveled from coast to coast. When a man hesitates to set his face against complacent customs and dig out for the broader view he lacks the courage that is so necessary to the advancement of his business.

I met an old friend of mine in Chicago not so very long ago, and while he had what he called a position, he explained to me that he was selling land—Western farms and orchards—and in that game we all understood that sales are not made every day.

This friend complained that he was waiting to close a couple of big deals and he was broke until he could make "a turn-over," when, of course, he would be on Easy street. He was so hard pressed that I insisted that he come and live at my home until he could accomplish the closing of some of the deals he had on hand.

At the end of a month he was still waiting and I was still feeding him and staking him to carfare. One Sunday morning I went out and got a full line of Chicago newspapers and announced the fact that Jack had loafed long enough and that I was going to get him a position. I spotted three good ads and answered them for him.

In Monday evening's mail there was an answer to one of the letters, and Jack went to see the man and got the position. The next Saturday night he came home with his wages. I laced it into him. "Jack," I said, "there are thousands of people just like you in this world and they are standing right in the way of other people. You're the kind that we shove aside so that we may pass by and get to our work."

Later on in the evening we were out for a stroll and I pointed out a store to him with the remark that that particular store had not had a change of window display in one solid month, and the man was a native-born—an American, and Jack was an American.

"There is some excuse for a foreigner with but limited capital, but no excuse, Jack," says I, "for you and that man—you both know the habits of the people of this country—what they like and what is progressive, and you're both asleep at the switch.

"Now I'm going to do something, Jack, and for awhile, anyhow, as long as I'm talking to this man, remember you're worth fifty thousand dollars and you're going to open a store right in the neighborhood, carrying the same kind of goods that this store is only half stocked with. I'm going to wake him up." We entered the store and Mr. Morton, the proprietor, advanced to meet us. I had talked to Morton before this several times on the subject of advertising and window displays. I thought best to start right in and give him the fright in one good, big dose.

"Mr. Morton, this is Mr. Jack Merkel. I want you to meet him because he is going to be a neighbor of yours. He's going to open that large store on the corner below here when the building is finished—in fact, all the papers have been signed and the goods ordered."

"What line are you going into, Mr. Merkel?" asked Morton.

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"The same as what you carry, Mr. Morton, only I will have a more complete stock." Jack commenced to throw around that fifty thousand dollars like so much stage money. Before I had a chance to butt in again I had figured that he had got rid of that fifty thousand dollars and was working in another fifty.

Just then Mr. Morton had to wait upon a customer, and I told Jack quietly to cut out blowing so much money, that Morton might tumble that we were kidding him. "Well," says Jack, "I had to keep talking about the money end to keep him from asking me technical questions that I wouldn't be able to answer."

We continued in conversation a little while longer when Morton did pop over a technical question, but Jack pulled out cigars right away and the talk turned to tobacco, and from that to generalities, and we managed to get away without him getting wise to the fact that Jack had only worked one week in three months, but I guess that one week's salary must have felt to Jack like fifty thousand anyhow.

My object in "kidding" Morton was to wake him up for his own good. I am glad to say that the time was



well spent. Within five days Morton began to make alterations. At the end of a month he had an entire new front in, and the inside was entirely remodeled. In a year and a half he doubled his business. You see, Morton was just like Jack—he had to be *pushed*.

Morton nailed me one day in Chicago and wanted to know whatever became of Merkel and the fifty thousand dollar store? "Gee!" he said, "but you fellows had me worried!"

Then I told him that I merely knew that the oppor-



tunity was right there where he was and that an idea came to me one evening that he could be pushed into a more progressive way of doing business where he couldn't be coaxed.

"I wasn't pushed," says Morton. "I was scared into it. Why, that fellow you had with you bought half of Chicago in a few minutes, and when you were looking in one of the show cases he told me quietly that his aunt had just died and left him a half million dollars."

I always knew that Jack was a pretty good fabricator, but he must have been in extra good trim that night. A week's wages will work wonders!

So, boys, and readers, perhaps you must be prodded and scared into action, that's the "why" of this story. For goodness' sake, get busy, I've given you some ideas for window displays in this article, use them now and be "the early bird," don't wait until the "night before Christmas" and be caught asleep.



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The Care and Repair of Bearings

Part 1—A Horse May be Only As Old As He Looks, But An Automobile Is As Old As Its Bearings.

BY J FRED GILMAN

HAVE you lost your bearings This question has nothing to do with a road map nor the absence of one, but to a more essential element for the automobile owner.

How long do you expect your new car to last? Two years? Three? Or do you know how long a car really ought to run? Very few persons do.

Automobiles are usually well built machines, yet the average life is only two years and a few months. Why? *Neglect*—that is the reason in one word. With the same care given machinery in factories, a car will run eight to ten years—and run better for that length of time than it has run during its present short life.

The owner is guilty of this neglect. He runs his car ten or twelve thousand miles and gives it attention only when it won't run any longer. Finally he sells or trades it in and gets exactly the value it is worth—"its junk value."

"Missouri stuff?" Well, I'll show you!

They say that a knock is better than a boost. That may be so where character is concerned, but when you're talking about an automobile engine, it isn't so at all.

A knocking engine is a heart breaker to any man who cares anything about his car and the fellow who doesn't care is usually driving somebody else's car. The man who hears the heart of his faithful engine throbbing like a steam riveter and does not relieve the congestion, would pull the arm off a baby.

There are not many automobile owners who know what a simple job it is to keep the car in maximum condition—to eliminate those little wreckers of efficiency—and keep the engine purring contentedly like it did the first day they "shot" up the street in it. They think it's hard, slow, dirty work. And so it is, and was, and ever shall be unless one knows the simple, sane way to go about it.

An automobile is only as good as its bearings. Whether these bearings be plain, babbitted or anti-friction, the value of the whole mechanism depends entirely on how carefully the bearing problem has been worked out and upon the type of bearing selected for its certain duty. The bearings must carry the load of the car. They must withstand the strains and stress of travel under all road conditions, and bearings, above all else, must be absolutely dependable.

A bearing may be defined as a support for a moving member, so designed as to minimize friction and receive wear and in addition to all this permit fine adjustment.

In the average six cylinder engine there are 96 bearings, six wrist pin, six crank pin, four main bearings, three camshaft, twelve cam, twelve push rod, twelve valve stem, two fan, two water pump, three oil pump, eight ignition system, six spark control, six carburetor control, four self-starter and four self-starter linkage bearings, totaling 96 bearings.

The crank pin bearings are usually in halves, the metal babbitt or bronze surrounded by a steel strap or casing. Adjustments for wear are made by taking out thin metal strips, called shims, which permit the halves of the bearing to be brought closer together. The main crank shaft bearings are of the same type.

Cam shaft bearings are usually bushings which must be replaced when worn; cam follower bearings may be simple flat plates resting directly upon the cam, or rollers running on a pin in the valve push rods. Wear usually is compensated for by adjusting screws on the push rods. The push rod guides are sometimes made of cast iron or other metal, with babbitt or bronze shell in bushing form and have to be replaced when worn.

All the bearings mentioned in the foregoing are cared for by the engine's lubricating system but the following bearings require self oiling.

The fan bearings are of the ball type and lubricated by an adjustable grease cup and are adjusted by tightening the cone. Water pump bearings are lubricated by compression grease cups and when they are badly worn it is necessary to drive out the bushings and replace with new, and generally the shaft also needs replacing. If this shaft is worn out of round, no amount of tightening of the stuffing box will prevent water from leaking from it.

In the ignition system ball bearings are always employed and these with or without means of adjustment. These are usually packed with grease. The rocker arm of the interrupter, of certain makes, requires no lubricant while upon others grease or oil is necessary. This feature should be carefully studied before serious complications develop.

The carburetor air valve bearing operates better if not lubricated but of course will wear and will eventually need replacing. The throttle bearings may be lubricated and would wear longer if this was done frequently, but this bearing is usually forgotten. When it does wear, air is admitted which is noticeable at low engine speeds, causing skipping and irregular engine action.

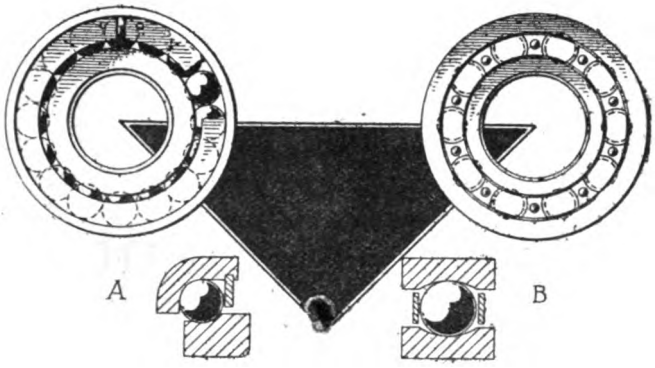
The spark and throttle control have a number of bearings, which may be of the steel ball-and-socket type or perhaps only a wire bent to fit into an eye. These pins must be lubricated frequently with an oil cam. These

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are not usually adjustable so the worn parts must be replaced by new.

Self-starter, motor and generator are equipped with ball bearings and are lubricated with an oil can. The other principal bearings are of the ball or roller type and full details are given in the instruction book which should be carefully studied.

In the steering gear there is a plain bronze bearing or



Two Types of Ball Bearings. A, Cup and Cone; B, Annular Bearing.

bushing in which the shaft is set out of center, so that when wear occurs, by twisting the bushing, the sector of the steering gear may be thrown deeper into mesh with the worm and take up whatever play is there.

In the transmission gear, in which all other bearings are of the ball or roller type, there will be found often a plain bearing on the forward end of the square or fluted shaft, called the pilot shaft bearing. When this bearing wears, the operation of the transmission becomes noisy and the gears very difficult to shift. The transmission must be disassembled, the bushing withdrawn and a new one pressed in.

The universal joints of the propeller shaft become very noisy when the bearings are worn. In modern construction these bearings are in the form of bushings, which may be replaced at small expense. The brake linkage has many bearings, which are clevis and pin. These are non-adjustable and should be oiled frequently.

To analyze the various types of the anti-friction bearings, one must first understand the difference between the two general classes; that is, those employing rollers and those employing balls to carry the load and reduce friction.

In the roller bearing, the load is supported along the entire length of the rollers, or along a line.

In the ball bearing it is supported practically on one point only. In other words, in the roller bearing there is line contact and in the ball bearing, point contact. Some ball bearings are provided with two rolls of balls, in which event there are two points of contact as against the line contact in the case of the roller bearing.

Two general types of ball bearings are in common use. In both of these types the point contact is typical of all ball bearings, hence at this contact point the surfaces are under enormous strain at all times. The cup and cone type are adjustable. It will carry a certain amount of side or thrust load as well as a vertical or radial load.

The annular ball bearing operates on a correct principle. Its carrying capacity is entirely a matter of the size of the bearing and of course the quality of the material used. This type is not adjustable for wear.

The tapered bearing, along with all other roller bearings, has the advantage of line contact or a generous load carrying capacity. This bearing is also designed to take end thrust and is made to be adjusted.

The parallel roller bearing involves the use of a flexible roller, introduces, however, entirely different conditions of operation and has many interesting advantages peculiar to itself.

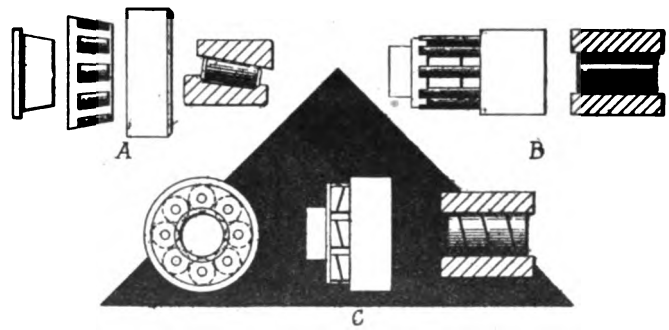
After reading the foregoing, one's thoughts naturally turn to the problem of caring for the bearings.

Keep grit of all kinds away from the bearings, as it will quickly grind them down, the wear depending on the amount and character of the grit.

After the bearing has been removed from its package do not allow it to lie around on dirty benches and pick it up, covered with dirt and foreign substances. For this reason a bearing should never be removed from its package until it is ready to be installed in the car. If the bearings that are being removed or being put in the car are covered with dirt they can be cleaned very easily with gasoline or kerosene and this should be done in all cases where old bearings are removed from a car and before they are replaced. Clean gasoline always should be used in washing them.

The presence of small particles of grit or dirt in the bearing will cause it to catch or stick; it will not turn freely and smoothly as it should.

What applies to the bearings holds good for the housing that holds them. They should be absolutely free from particles of dirt. The threads for grease or oil



A, Components of Taper Roller Bearing; B, Solid Type Roller Bearing; C, Spring Roller Bearing.

cups should not be drilled or tapped out with the bearing in place.

Note that the grease or oil used is clean, as dirt is likely to be introduced in this manner. The balls must run over foreign matter like a stone crusher and if they fail to pass over the bearing will stick.

In replacing broken or worn balls in a bearing, no ball

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should be more than .001 of an inch smaller than the others, never larger.

Another deadly enemy to bearings is rust and precautions should be taken to keep the bearings dry at all times.

Greases containing acids and alkalies also have a destructive influence on the bearings and the containers as it ruins the smooth, hard finish on which the life of the ball greatly depends. For this reason animal oils or greases should not be used as they become rancid in time. A neutral mineral oil or grease is the best lubricant for bearings. Also use a lubricant that will not become thin and run when the bearing is subjected to heat as trouble will naturally result.

Distortion of the ball retainers should be guarded against, and in removing or replacing balls the retainers should be handled carefully.

Replace all balls that are broken or have the appearance of being worn as soon as possible, as worn or broken balls shorten the life of the rest of the balls and the ball race.

(To be continued.)

War Time Advertising Important

Good-Will, Created Through Years of Effort, Must Be Safeguarded as the Most Valuable Asset of a Business

BY HON. WILLIAM B. COLVER*

DISCONTINUANCE or even sharp curtailment of advertising because of temporary war conditions would seem to imperil the most valuable asset that any business has—namely, its good-will. No more faulty logic can be found than that which would impel a manufacturer to cease building for the future by means of advertising simply because the output of his factory is, for the time being, restricted; or because diversion of his facilities to war work has operated to withhold his goods from accustomed markets. In modern business there can be no sufficient-unto-the-day policy.

In advertising the business man has built up the intangible or spiritual side of his business, if such it may be designated, as distinct from the material side. It is the spiritual side, as represented by good-will that is slower of growth and that is the more seriously jeopardized by neglect—neglect which could take no more disastrous form than an interruption to advertising.

For example, if I have the requisite capital I can build alongside the plant of the Columbia Graphaphone Company a factory equal in all respects to the Columbia manufactory. Assume that I can turn out an instrument comparable in every way to the Columbia product and in equal numbers. Yet I am not even a going concern. I cannot sell that instrument to the public in profitable quantities until I build up the good-will that the Columbia Company has acquired by years of advertising.

Good-will, in my estimation, is far more valuable than the physical property with which it is linked. The physical property is, in a measure, useless without the vitalizing spark of good-will. The Proctor & Gamble plant might be completely destroyed by fire, and yet the havoc would not extend to the commercial identity represented by the name Ivory Soap. Far from sustaining loss, the good-will inherent in the word "Ivory" would, if anything, be enhanced by reason of that trait of human nature which makes the public the more eager to obtain that which is denied to it or which is obtainable only over difficulty.

That, at times such as the present, there should be some hestitancy regarding advertising policy may be because it has never been scientifically determined what proportion of advertising expense is an operating charge and what proportion a capital charge. In my estimation, only a small part, if any, of advertising expenditure is properly chargeable as a current item of sales expense; but is, rather, when translated into terms of good-will, a permanent investment and hence a capital charge. Given this conviction, it must appear quite as short-sighted to discontinue advertising merely because the war has momentarily interrupted distribution as it would be deemed unwise of a manufacturer to junk a portion of his factory equipment because there had been interruption to its use.

The manufacturer who has converted his factory to war work and has therefore interrupted the production of his original line, does not tear down and discard his expensive machinery to save the insurance premiums or other similar expenses. It would be just as sensible for a manufacturer, whose commercial integrity is founded upon advertising, to abandon his advertising campaign in order to save the carrying charge on his greatest asset —good-will.

Many "Sales" Made Long in Advance.

Not the least of the considerations, certainly, that argue for the continuance without interruption of the advertising of all the concerns that will come back after

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the war, is that sales are in reality made long in advance of the actual transaction that we commonly refer to as the "sale." This will be especially true in the war period.

For example, I have no doubt that, even under the normal pre-war conditions, thousands of persons who did not possess a musical instrument were sold on, say, the Chickering piano. They might be without means for the time being to carry out their determination to own a Chickering, or there might be other deterring reasons —for instance, a family might be planning removal to a new home, and therefore disposed to postpone purchase. The underlying fact in each such case is, however, that the prospect had absolutely made up his or her mind to some day own a piano and had come to the conclusion that the piano when it is purchased will be a Chickering.

Such anticipatory sales may not be precisely on a plane with transactions where an initial payment has been made, but certainly they do have a real value, and are a part of the intangible assets of the business. For the maintenance of such an asset, however, it is essential that there be reiteration and reminders in the form of continuous advertising that keeps alive the interest and the conviction of the prospect once won. Otherwise a competitor, with repeated well-told selling talks, will effect the mental sale and hold it. It would appear that the opportunities for thus, in effect, making sales for future delivery must be especially favorable during the war, when the barrier to immediate consummation of the trade is likely to be found not in lack of purchase price, but in inability to obtain delivery of the goods.

Seemingly the prospect who is converted by advertising under such circumstances is likely to be especially firm in allegiance. I fancy I hear him saying: "I may not be able to get Wesson's Oil now, but when I can get it I am going to have it." The more rapid turnover of money that has come to a considerable portion of the population incident to the war period is bound to encourage the planning in the present for purchase that will be made in the future, when stocks of goods again become available. I imagine I can hear many a citizen reasoning somewhat in this wise: "I have always wanted that set of Dickens or that Pianola, but I put off making the purchase, and now I can't get them. However, you can bet that as soon as we get out of this war mess I am going to act without delay and before anything else occurs to interfere."

Persistent Advertising Is Insurance.

There is scant justification, it would seem, for the misgivings of the advertiser who is prone to allow his investment in good-will to go by default merely because he suspects that popular demand or the conditions of distribution may undergo some radical change after the war. If a business man is basing his expectations upon an unworthy product he might as well abandon it once and for all. For the manufacturer, however, who has faith in his product there is every reason to have faith in the future and every incentive to take out insurance in the form of persistent advertising.

The form that this war-time advertising can take to best advantage is a question for the judgment of the experienced advertising men, who are familiar with the business interests whose good-will is to be safeguarded. The copy may take the form of good-will advertising, so-called. It may be explanatory of the Government demand, which, as in the case of "Bull Durham," curtails civilian supply. Or again, it might specifically aim at creation of after-the-war demand. If the responsibility were mine I believe that I would be tempted to try, in the present predicament, what might be termed tantalizing copy—messages that would provoke the damn-the-kaiser sentiment on the part of Americans temporarily deprived of articles on which they are, if anything, more solidly sold than ever before.

Dominating the minor considerations of ways and means is the big idea that an advertiser is justified, in the face of suspended animation, commercially speaking, in doing everything within his power to sustain his commercial integrity and preserve his commercial identity. Let the corporation with such an asset use its surplus, employ its undivided profits, or even borrow money to protect, by means of consistent and insistent advertising, that invaluable, intangible asset—good-will, which is the one thing that cannot be bought out of hand after the war.

They told me when I was a youngster that "even the Lord can't make a two-year-old calf in a minute." Big advertising spreads after the war will meet equally big spreads. Business will bid for public attention and interest on a bull market. The purpose will be to put a punch into the good-will that has gone flabby. The man who goes into that contest with a public attention and interest which he has never allowed to relax will go in with his good-will trained to the minute. He will win.

*Chairman, Federal Trade Commission. Reprinted from Editor and Publisher for August 24, 1918.

THE WHY OF THE SPARK LEVER.

Gas in an Engine Doesn't Explode—It Burns, and To Make Allowances for This Slow Combustion the Spark Lever Must Be Advanced.

By Jacques Mansfield.

THE enormous decrease in automobile manufacture caused by Uncle Sam's need of material and of the facilities with which automobile factories are equipped to turn out government work, has brought the car owner to a full realization of the possibilities of his old car; in understanding its mechanism to the extent of repairing and renovating it.

He is apt to regard its electrical system as a science appertaining exclusively to individuals of especially high mentality and assumes that without a prolonged tech-

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nical education that he has no chance to comprehend its mysteries.

This state of mind exists with thousands of motorists who take an intelligent interest in the maintenance and upkeep of their car. While it is very true that no one knows just what electricity is, it is not impossible for any one to understand the working of the various electrical apparatus that is attached to the modern automobile.

When car owners know the first principles of this electrical apparatus, and the proper care of its important units and parts, they will find that it is not hard nor difficult, and what is more, they usually develop a pride in being able to keep their car in first class condition and in rendering "first aid" without depending upon mechanics or service men, besides realizing the help that they personally are rendering the government by lightening the load on garages and repair shops.

One of the most abused and misunderstood levers on an automobile is the spark control lever located on the steering column. The amateur driver retards the spark when starting the car and moves it upward when the engine starts running.

Why?

Simply because he has been told to do so. That it should be adjusted according to speed and road conditions, or even moved at all after once starting the engine is beyond his comprehension. He knows, of course, that this lever controls the spark and that the spark explodes the gas mixture in the cylinders, but just why it should be advanced or retarded is information of which most motorists have no knowledge. To know that economy, safety in starting and numerous other reasons depend upon its proper use should stimulate the car driver to familiarize himself with at least a slight working knowledge of the electrical system.

On a few makes of cars the spark is automatically set so that the driver controls the car with the use of the hand throttle or accelerator only, but the greater majority of cars today require that the spark be adjusted by a hand lever.

In ordinary driving the position of the spark lever need not be changed except for unusual road conditions, after it is once set to run through a considerable range of speed. This condition is best found by the driver adjusting and experimenting with the particular driving range adapted to that type of car.

In going up a heavy grade, nine out of every ten drivers "rush" their car for the simple reason that they are too lazy to shift the gears.

True, it is a grand and glorious feeling to be able to skim over the top of a steep hill like a bird, but just how long will your engine stand for this abuse before it begins to voice its disgust in numerous knocks and rattles?

Just how much rubber has been chewed from the tires as they obtained traction for that "rush"? And how much gasoline has been consumed in that "getaway"?

Of course, the automobile engine is an inanimate thing but it is nevertheless able to talk in its own language and constantly does so, even if it is not understood. The car owner, after driving for some time begins to understand this language and consequently any unusual noises are very noticeable. The noise should at once be investigated and interpreted as soon as it develops, for immediate attention may often prevent a burnt-out bearing or some other serious mechanical difficulty that may shortly incur a large repair bill.

When the engine is running at normal speed, the timing should be so set that the explosion takes place before the piston reaches the top of its compression stroke. The later the spark, the slower the speed of the engine and naturally the less power developed.

If the timing was fixed to fire the mixture before the piston reached the top of its compression stroke, in starting, the engine would kick back, and right here rests the reason for retarding the spark when starting the engine.

If it is necessary to retard the spark when starting the engine, it is also necessary to advance the spark in order to obtain more power. The piston moves so fast that it is part way down the cylinder before the explosion catches up to it and of course the real force of the expansion of the gas is lost. By advancing the spark the explosion occurs earlier and the full length of the power stroke is utilized.

This matter of advancing and retarding the spark while on the road should be used to advantage. On some cars the spark range is marked upon the sector while on others this feature is left to the driver's judgment.

The "knock" from an engine laboring up a hill is due to the fact that the spark occurs on the compression stroke and the explosion meeting the piston coming up tries to force it backward, thus producing a sharp, metallic thump. This "knock" would not occur on a level road unless the car was loaded, for the crankshaft is turning so rapidly that the piston has time to pass dead-center and start on the down stroke before the pressure of the explosion is at its maximum. At all times the spark should be kept as far advanced as possible without causing the engine to "knock," for a low set spark tends to heat the engine and also to reduce its power.

One of the best ways to learn the proper use of the spark lever and also to drive a car properly, is to drive at a steady speed no matter what road conditions are encountered, continually watching the speedometer hand to see that it maintains a constant reading throughout the test, regulating the spark and throttle and shifting gears when necessary. In this way considerably more can be learned about the flexibility of the engine and the use of the spark than if one drove many times in the ordinary way.

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Salvaging an Old Engine

Second Installment of the Article Dealing With the Rescue of a Deceased Patient

BY W. O. MANN

THE remaining crankshaft bearing, which was babbitted, was so far gone that it looked serious. There had been originally a sixteenth of an inch of babbitt all round. At some period the engine had apparently been run without oil, and the babbitt had become hot enough to move around and get into terrible shape, incidentally covering up the big oil-hole into which lubricant from the crankcase was splashed. There was nothing to do

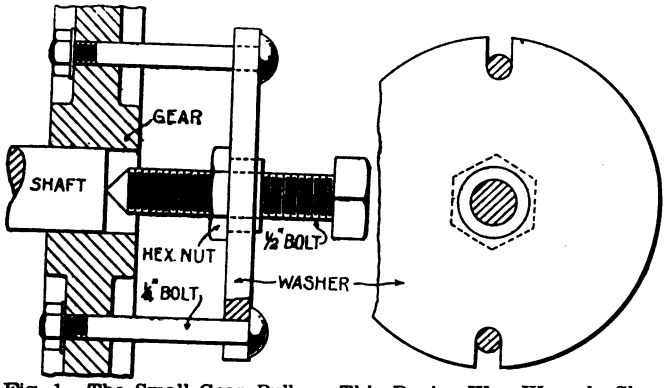


Fig. 1.—The Small Gear Puller. This Device Was Wrongly Shown in the First Installment.

but melt out the old soft metal and scheme some way of re-lining. Luckily the shaft had not gone through the babbitt at any point and so was not damaged.

A Main Bearing.

A new bearing surface was provided in the following manner. A piece of brass tubing was found that was just a shade smaller than the shaft—a piece of shafting would have answered just as well, but the tubing happened to be at hand and saved the situation. A piece of one-inch hardwood was very carefully surfaced on one side, a straightedge being used to get the surface as true as possible in every direction. A hole was bored in the middle, into which the tube fitted tightly, and the tube was very carefully squared with the trued surface of the wood, so that it was at right angles to it on all sides; little wooden wedges dipped in shellac held it firmly.

The bushing was slipped over the tube, flange down, and held in position by four screws, the heads of which came down on the edge of the flange. The position of the bushing was determined with care by calipering it. The inside of the bushing was rough and so could not be used for this purpose, and, anyway, it was so close to the tube that there was no room. So the calipers were placed against the outside of the bushing, which was machined, and the inside of the tube.

After a good deal of rather exasperating work the bushing and the tube were concentric and the former was made tight. Previously the inside of the bushing had been cleaned and tinned with ordinary solder, so that the babbitt would stick. See Fig. 3.

While the babbitt was melting a torch was turned on the bushing and the tube, which were gradually heated up until the point was reached where the wood block began to scorch, which was about as far as it was safe to go. Then the babbitt was poured in. Because of the narrowness of the space this was a mean job; much more was spilled than went in. The metal did not run down well and it was poked down with a piece of heated wire and the torch was kept playing on the sides so the babbitt would keep hot and settle down and fill the space.

The result was very satisfactory. The lining was good, only a few little seams showing where the run had been poor. Probably a better and quicker job could be done by arranging a sort of funnel or flange, as shown in Fig. 3, at the top of the bushing to hold a considerable body of melted metal and the metal forced underneath into the space; that's the way it's going to be done next time, anyway. By the way, it should have been stated that the brass tube was heavily smoked by means of a common candle, which prevented its being immovably held in the babbitt.

The bushing was put in its place in the crankcase and the shaft worked into it by degrees. The outer end

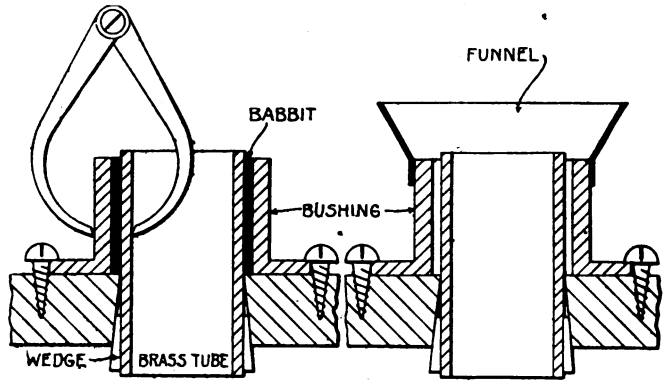


Fig. 3—Jig for Rebabbitting the Main Bearings.

of the journal—that is, the part of the shaft that runs in the bearing—was just a trifle rounded, so that it was possible, by twisting the shaft, to force it in a little way at a time, easing the hard spots with a round-nosed scraper as the process went on, until finally the journal was all the way in and a very tight fit. After that it was simply a matter of marking with red lead and scraping until an exceedingly good bearing was obtained. In fact, one could hardly have wanted a better

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job—and it cost merely quite a bit of time and the price of a pound of metal, which was in the shop anyway.

Cylinders Not Badly Worn.

A careful calipering of the cylinders came next, and this revealed that all four were worn just a little oval, though the surfaces luckily—very luckily, considering the way the poor old engine had been starved of oil—

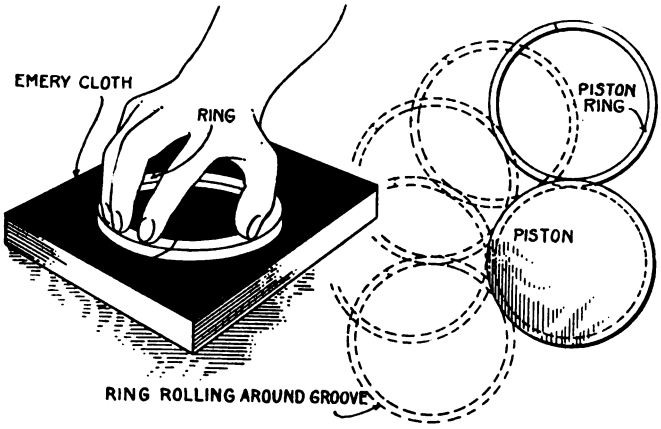


Fig. 4—Fitting Piston Rings.

were perfectly smooth and glassy. Naturally the pistons were also in good shape, and hardly worn at all; but the rings, as has been stated, were simply impossible, so it was decided to part with the price of a new set.

Here a question arose. Oval cylinders and piston rings of the ordinary type do not work well together. In time the rings will wear to fit, if the eccentricity is not too much, but it takes time, and in the meanwhile the compression is bad. Furthermore, once the rings are worn in they must be kept in absolutely the same positions, or there will be no compression worth mentioning.

So a ring* was used that is so made that it will expand more in one place than another and so exactly fill a distorted cylinder bore. It was of the three-part type and, to make a long story a little less long, it did the business, holding compression remarkably well even when first put in—which is saying a good deal.

It happened that the rings were a shade tight in the grooves. This was remedied by running the rings down to fit the grooves, placing them flat on a sheet of very fine emery cloth and polishing them down until they entered the grooves easily but without play. See Fig. 4. In doing this it is not necessary to expand the ring over the piston and put it into the groove, to try for size. The fit can be ascertained by simply rolling the ring around in its groove as one gear rolls on another. The greatest pains must be taken to wash away all traces of emery after the job has been finished.

This much done, it began to look as if the big jobs were over and the rest were simply ordinary adjustments and so on. "But it is to laugh," as the French say. The taking up of the connecting-rod big-ends was tackled next, and their adjustment was made easy by replacing the old solid shims with laminated brass shims, from which thin layers were peeled one at a time until the desired thickness was obtained.

But it turned out that the crankpins were worn oval, the varying pressures causing varying wear at different points, so that when the rod was made perfectly tight at one point it was so loose that it would shake at another. Of course the big wear comes where the initial pressure of the explosion forces the rod against the pin.

Here was a poser. Running with the pins in that condition was utterly out of the question, and yet the alternative of sending the shaft to a machine shop and having them trued up was not to be considered if it could possibly be avoided. It was avoided.

The pins were ground true with valve-grinding compound. Of course it was out of the question to use the bushings for the purpose, so the bushings, which were of babbit and removable, were taken out of one of the connecting rods and a special bushing cast of babbitt, using the big end of the rod for a mould and a piece of brass tube for a core, the tube being of about the same diameter as the crankpin.

This bushing did not need to be at all accurate. It was split after cooling and the surfaces for half an inch from the split relieved, so that only the top and bottom would rest on the crankpin. See Fig. 5. The rod with its new bushing was adjusted to the pin with shims precisely as a regular adjustment is made, except that it was considerably too tight for running. Then it was taken off, coarse valve grinding compound smeared on the babbitt surfaces, replaced and tightened up.

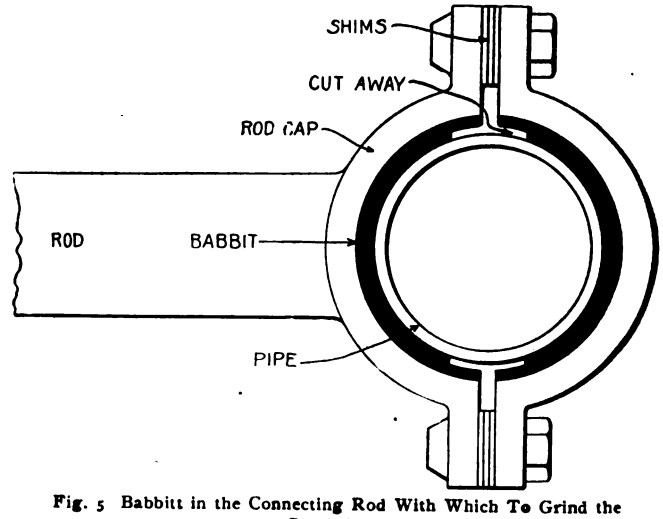


Fig. 5 Babbitt in the Connecting Rod With Which To Grind the Crank Pins.

Then the rod was worked back and forth, back and forth, back and forth, over the tight places, until they gradually came down. It was necessary to put on fresh compound and remove shims several times for each pin. One pin was a good deal worse than the others, for some reason, and it seemed as if the grinding process never would reduce the high spots. So they were very cautiously dressed with a dead smooth flat file.

It is worth noting here that some files are not per-

(Note: The rings used in this case were the "Ever-Tight.")

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fectly straight across, but are slighty curved—either concave or convex. Such a file will make trouble. See that the surface is flat, and it will leave the pin in proper condition. After getting the worst of the "humps" off with the file, grinding was again taken up, which brought the surface down smooth and removed the irregularities which cannot be avoided in filing such a job.

When the rod could be moved in a complete circle without being tighter at one place than another a final finishing was given with the finest grinding compound, the pin washed and rubbed absolutely clean and the regular bushings adjusted.

In order to avoid grinding grooves and scores into the pin the grinding bushing was made narrower than the regular bushing, which has a flange and is wider than the connecting rod itself by the width of the flange. The grinding bushing, having no flange, could be moved almost a quarter of an inch lengthwise on the crankpin, and by keeping it moving pretty constantly the surface was kept perfectly smooth and free from scratches and grooves.

The only danger in doing a job of this sort is that the pin may be ground out of parallel with the shaft. To avoid this it is necessary to avoid putting side pressure on the rod when working it back and forth, and to see that the bushing is always put into the rod—that is, the grinding bushing—in the same position, so that it keeps itself true.

When filing is necessary it is simply a case of care, plus knowing how to use a file. If only a very little is removed it is not likely that the pin could be damaged because the part not filed acts as a guide and tends to bring the rest into line. If there is much to come off, the greatest care is needed in filing. It is true, however, that excellent results can be obtained even when a pin is badly worn.

An Oiling System "Stunt."

So far as the rest of the work was concerned there was nothing difficult about it, for the most part. A number of little stunts were done that helped, however. For instance, the oil pump took oil direct from the bottom of a sub-base without a strainer, and anything that got into the oil would simply go on circulating until it had worn itself out and done all the damage it could. So a fine-mesh tea strainer was bought, the handle taken off and the bowl soldered over the oil pipe intake, as in Fig. 6.

The drain-plug at the bottom of the sheet steel oil pan was very unsatisfactory, for the gas-pipe fitting into which it screwed projected nearly quarter of an inch up into the pan, making it impossible to completely drain off old oil and sediment. This was removed.

The bottom of the base, around the hole, was tinned, as was also the shank of an ordinary drain-cock, which was then just started in the hole—enough so that it would stay in position. Then a ring of mud—not even clay, just mud—was built around it and the space filled with molten babbitt which was afterwards trimmed neatly. The drain opening was thus lower than the bottom of the pan. Both these wrinkles have proved very satisfactory.

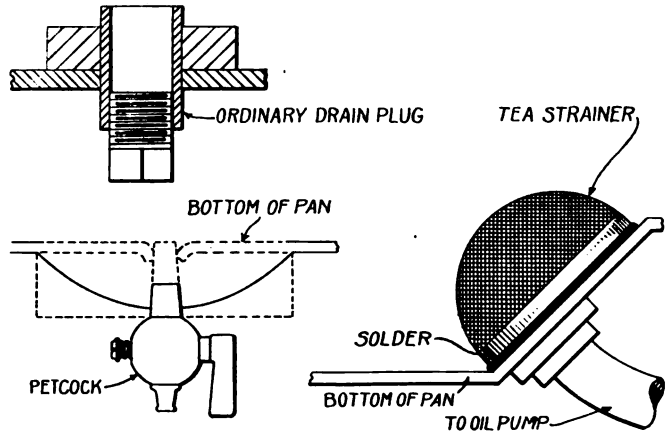


Fig. 6—Replacing the Drain Cock with a Petcock and Showing How the Oil Pump Was Fitted with a Strainer.

MOTOR LORRIES IN ENGLAND.

Motor Trucks Have Been Used in England Longer Than in This Country and the Merchants Cannot Carry on Business Without Them.

BY SYDNEY F. WALKER, M. E.

SINCE the shortage of gasoline, tradesmen's and manufacturers' vans and lorries have been run on kerosene with considerable success. Most of them were run on gasoline before the shortage, and have been converted to kerosene by the aid of one of the vaporizers that were described last month in the Automobile Dealer and Repairer.

The following is a list of some of the trades in which motor vans and lorries are employed: Delivery vans, and lorries used by the railway companies; by bakers, millers and corn merchants; by drapers; by grocery, sweetmeat and kindred trades; furniture manufacturers and dealers; express carriers; laundries; manufacturing chemists; mineral water manufacturers; paper manufacturers, the textile industry; wine and spirit merchants; engineers, and others.

The engines are usually of four cylinders; in a few cases, the larger ones are of six cylinders; they usually are run at 1,000 revolutions per minute; the sizes of the engines range from 3½ inch bore by 5½ inch stroke, up to 5 inch bore by 6 inch stroke, and the H. P. ranges from 20 up to 50. The power is delivered to the rear axle, in some cases by cardan shaft, and worm gear; sometimes by cardan shaft and bevel gear, and sometimes by chains.

The frames of the cars are made in some cases from pressed steel, usually of channel section; in a few cases of nickel steel. The gear wheels are nearly always of

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nickel steel, and give three speeds forward and one reverse; in a few cases, four forward speeds are given. The lubrication is partly the usual splash from the crankcase, the big ends carrying dippers and partly forced by the aid of an oil pump. The wheels are usually of steel and sometimes have solid rubber tires, sometimes steel tires, the wheel in the latter case being all in one.

The cost of running motor vans and motor lorries has, of course, increased enormously since the war, and no reliable figures are available for the present time; there are plenty of figures, however, of costs taken just before the war, and it will not be a difficult matter to estimate what the cost is likely to be after the war. Before the war the price of gasoline in the United Kingdom was 36 cents per gallon, while that of kerosene was only 16 cents. The following are the costs of commercial vehicles, taken from the different trades mentioned above, and with different loads, ranging from 12 cwts. up to 5 tons.

All the vehicles have been found to be able to make journeys ranging from 300 miles per week up to 420; and the cost per ton mile with a 12 cwt. vehicle loaded both ways ranged from 15.0 cents down to 12.6 cents; when loaded only one way, the vehicle returning empty, the cost per ton mile ranged from 28.8 cents down to 25.2 cents.

With a one-ton vehicle, the cost per ton mile loaded both ways ranges from 8.6 cents up to 10.1 cents; and the average cost steadily decreased as the size of the lorries increased, till with a 5 ton load it ranged from 3.15 cents to 3.8 cents.

The above costs are obtained by taking the actual costs running with gasoline, and allowing the difference in fuel cost when running with kerosene; the difference in fuel cost, allowing for the lower cost of kerosene, its lower calorific value, and the other points that have been mentioned, may be taken as 50%; the fuel cost of running with kerosene is half that with gasoline; and this applies to nearly every kind of vehicle.

In the costs given above tire depreciation, lubrication; depreciation of the vehicle at 15% per an. without tires; maintenance, that is to say, repairs; insurance, drivers and storage, are all charged. The insurance ranges from $1.50 to $1.75 per week; storage, uniformly at $1.25 per week; driver, uniformly at $8.75 per week; tire depreciation, $5.00 per week, up to $16.00; lubrication, 75 cents per week up to $1.50; repairs, etc., $2.50 up to $7.00.

The following particulars of the deliveries of a 12 cwt. van in Glasgow may be of interest. In three hours the total distance traveled was 23 miles; running time and stopping time 1½ hours each, 16 stoppages being made of from 1 to 43 minutes.

It is not easy to obtain the figures for horse haulage, as users have not often taken the trouble to get them out; but the figures obtained from the manager of a Co-operative Society covering a very large area, serving a large colliery district, show a saving of 6 cents per mile traveled in favor of motor transport, where with horse haulage, three pairs of horse vans were employed with only one horse in reserve. With a 2 ton lorry a saving of 5½ cents per ton mile is shown.

The manager of the Co-operative Society reports also that by the aid of motor vans and motor lorries he had been able to increase his turnover by $320,000 in six months.

It should, perhaps, be mentioned that co-operative societies exist in the United Kingdom in every town and in every industrial district, particularly in the colliery districts; they are established and run principally by working men for working men.

The principle upon which they are run is, goods are sold at as low a figure as possible, and all profits, after paying working expenses, are divided among the members. Some of the societies, particularly one having its headquarters in Manchester, and another with its headquarters in Barnsley, the center of the principal Yorkshire coal field, do a very large business, indeed, wholesale as well as retail; the large establishment in Manchester manufactures a great deal of the goods supplied and distributes them to branches established in towns and villages extending over a very wide area, at least 50 miles from the center; the branches also make and distribute bread, deal in milk, coal, and practically everything that is wanted in the home for food, warming or clothing. It will be seen, therefore, that praise from one of them is praise indeed; they are out to save money all the time.

THE AUTOMOBILE IS NOT A PLEASURE CAR; IT IS A VITAL WAR ESSENTIAL.

WHY is it that the Government still persists in the idea of classifying the automobile as a luxury, which must submit to suppression or something approaching it. Can officialdom never realize that the automobile has supplanted the horse-drawn vehicle in every farming community as well as in the cities? Farmers now use motor cars where horses were formerly employed.

The great farming State of Iowa is said to have a motor car to every 14 of its inhabitants. To call the auto industry a non-essential is as ridiculous as it would be to call the horse-drawn vehicle industry non-essential, and no politician would probably dare to do that—unless he was tired of his job. Farmers everywhere are using automobiles where formerly they used horses.

Do you hold your head erect, breathe deeply, and look every man in the eye? If you do, you are well and happy. A man who doesn't pay his bills promptly or who has continually to take a cross street to escape a creditor, is never ready to look people in the eye.

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The Pulse of the Electric System

Every Instrument on the Dash Board Is There For a Purpose, Keep Yourself Informed As To the Reason.

BY WM. H. STEWART, JR.*

IT certainly is funny, but the average motorist today does not use either his ears or his eyes, especially the latter, although he is not entirely to blame. He has not been brought to the realization that his automobile is a complicated mass of machinery. Manufacturers have always aimed to make their machines as simple as possible. "Foolproof" is a statement which many of them make.

Let me explain what I mean by my statement that the

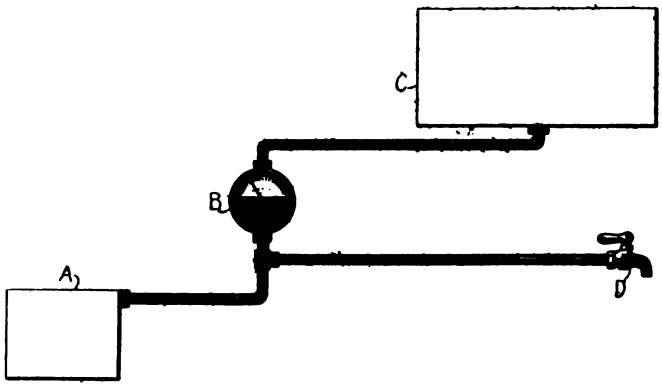


Fig. 1.—Water System to Illustrate Electrical Generator, Battery, and Line.

motorist does not use his eyes. Upon the dashboard of nearly every machine now being manufactured is a little device called the ammeter. This ammeter is to the motorist what the barometer is to the weather man, what to the mariner. It tells the automobilist just what is the caliper is to the machinist, and what the compass is going on in the electrical system. It tells whether the generator is functioning properly, whether the battery is receiving its proper amount of current, how much is being used by the ignition system or the lights, and whether or not there is a fault in the wiring.

If I may use the term, it is the "pulse" of the electrical system, and the electrical system is the nervous system of the automobile. Let me tell you what the ammeter is for, and what it does, then I trust you will use your eyes in the future because you will realize how valuable this little device is.

First let us trace the current when the ignition unit is being used. The current passes from the positive terminal of the battery to the ammeter and thence to a junction box or the ignition switch. From the switch it goes to the ignition unit and through it to the frame or a second wire back to the battery.

If lights are in use, current for them also passes through the common wire from the battery to the ammeter, thence to the switch, then the lights and back to the battery.

No matter whether the positive or negative battery pole is grounded, the path of the current is the same, it only runs in a different direction. At any rate, the point brought out is that all of the current used for lighting or ignition must pass through the ammeter before it is distributed to the various units.

When the Cut-Out Closes.

With the engine in operation at car speed of above fifteen miles per hour, current is generated in the dynamo or generator and passes through the cut-out to the ammeter and thence to the battery, then through a wire or the frame back to the generator. When the car speed is below 10 m.p.h. or when the generator is idle, this circuit is broken automatically by the cut-out, so that no current can pass back to the generator from the battery. All of the current generated, then, must pass through the ammeter also; but in the *opposite direction* from that used by the ignition and lighting system.

The ammeter indicates in which direction the current is flowing. It has a center zero mark usually, and when current flows from the generator into the battery the needle is deflected in one direction and indicates "charge." When the engine is idle and lights are used, the needle will indicate "discharge," because current is being used from the battery.

Let us consider, for a moment, a water system comprising the corresponding units of a water pump, a meter,

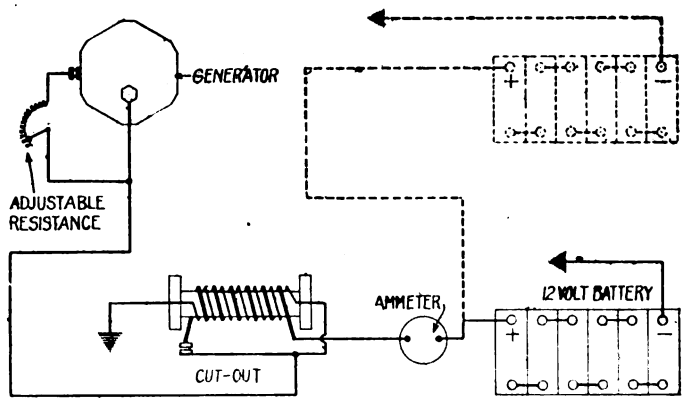


Fig. 2.—Simple Wiring of Generator, Cut-out, Ammeter and Two Sets of Batteries.

a tank and a faucet. The layout of such a system is shown in Figure 1 and consists of the pump A, compared with the generator of an electric system; the meter B, compared to the ammeter; the gravity tank C, compared with the storage battery; and the faucet or outlet D, which represents the lighting or ignition system.

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With the faucet D closed and the pump A in operation, the meter B will indicate that water is passing into the tank C. With the pump at rest and the faucet D open, water will run from the tank through the meter, which will register backward or "discharge," to the faucet.

Comparison With a Water System.

Now suppose the faucet is open and the pump in operation; if the pump supplies more water than is being drawn through the faucet, then the meter will indicate water passing into the tank. In other words, the meter will show the excess amount supplied by the pump and not being used. So it is with the electrical system. The ammeter tells how much current is going into or running from the battery.

In a well-balanced system the generator furnishes just enough current to supply all of the lights and the ignition system with no excess. This current is usually from eight to ten amperes and is had at about fifteen miles per hour car speed.

The ignition system (after starting) requires approximately two amperes, dash and tail lights two amperes, head lights from two to three amperes each, and the dimmer lights from one to two amperes each. The starting motor current is not carried through the ammeter.

It is an easy matter, then, to locate trouble in the system by considering these figures. Suppose the engine to be idle. Turn on the dimmer bulbs and note the ammeter reading. If it is more than three amperes discharge it indicates trouble on the line, either a short circuit or a grounded wire.

Next turn on the tail and dash lights and note the reading. Do the same with all of the lights and be guided by the readings. Then start the engine at a low speed, and with all the lights off the reading should not be more than three amperes. Note, however, that the ignition system may take as high as seven or eight amperes when first turned on with the engine idle. This is important and one can see that the ignition switch should not be turned on until ready to start the engine.

With all of the lights off and the engine running at low speed the ammeter will register discharge. When the engine is operated at a speed corresponding to from 10 to 12 miles per hour car speed, the ammeter will begin to register charge, and this reading will increase with the engine speed until it reaches its maximum, depending upon the make of car. As a machine is operated mostly during the day, the battery will be charged steadily and will only be drawn upon during the evening, and then only in proportion to the amount of current furnished by the generator below that necessary to supply the lights.

If you watch the ammeter, then you can tell whether there is a short circuit in the system; whether the generator is doing its part; if the lights are using too much current and if the cut-out is working properly. The ammeter is put there to be consulted—do so.

*President Stewart Automobile School.

Tools That Mississippi Garagemen Use

The Garagemen in the South Have Been Hit by the Draft and Are Replacing Men with Machines.

BY JAMES F. HOBART, M. E.

GARAGES and automobile repair shops are not usually burdened with more tools than are needed, but occasionally a shop is found where there is a machine or tool for most any kind of repair work that is ever likely to come along. In a Mississippi shop, the same one which had the boxes for auto parts, described in a recent issue of this journal, the writer saw as fine a little bench lathe as ever graced the shop of a model-maker.

It was a most complete little screw-cutting lathe, with all the appliances and fittings which go with such tools, including chucks, light grinding and boring attachments, a taper attachment, and last, but not least, an overhead grinding roll. This was a plain roll, longer than the lathe bed, and mounted in bearings of its own, directly above the lathe.

A very small motor, one which was almost a toy, seemingly, and which would rate about "one cat power," was arranged to drive the roll at quite a high rate of speed. The use of this roll was to drive a small grinding wheel which was placed upon the tool post of the lathe, same as an ordinary tool is there fastened. The object to be ground would be placed between the lathe centers in the usual manner and revolved at a slow rate of speed, while the grinding wheel was traversed along the work by means of the regular rod feed of the little lathe.

Many lathes are used for grinding, although it is said to be pretty tough on the lathe V's which may be worn badly by the grinding wheel dust, but most lathes use a grinding wheel driven by a direct connected or built-in little motor which is placed in the tool post same as described above. But the vibrations of the heavier motor may cause the grinding wheel to vibrate too much, hence the liking of fine lathe workers for the overhead roll for speeding up the grinding wheels.

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A Welding Bench de Luxe.

A bench for oxy-acetylene welding, in use in the shop above noted, is certainly a bit of very useful luxury, and beats both "going and coming" the fashion of welding upon the floor or upon a brick pavement. As shown by Fig. 1 the bench is made of angle steel, some tank steel

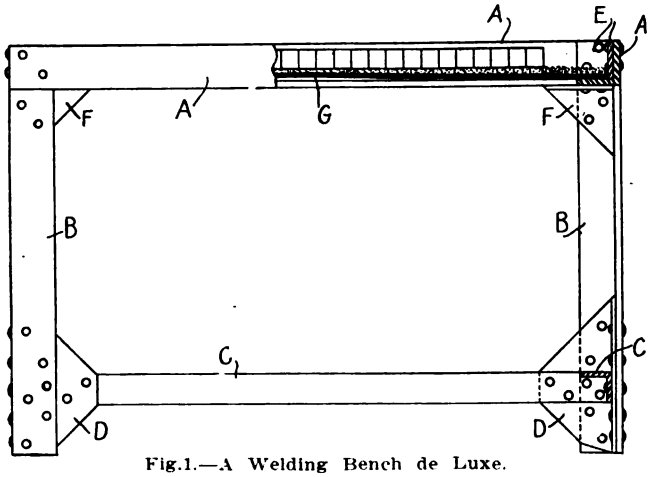


Fig.1.—A Welding Bench de Luxe.

plates and a few fire bricks. Common bricks will answer pretty well if fire bricks are not available.

The top of the welding bench was made up of a frame of angle steel with the corners mitered together and fastened by means of angle pieces riveted inside of each corner. These sides are shown in Fig. 1 at A, A, and one of the corner irons is shown at E. The legs are four plain pieces of angle steel, cut square at each end and fastened to the top frame by an "angle gusset" sheet at each corner, one of which is shown by F, Fig. 2. The leg B and plate F taking the same reference letters as in Fig. 1.

The legs are further stiffened by girts C, C, four of which are used as shown. These girts are fastened to the posts B, by means of triangular plates which hold the frame securely against "racking," and therefore act as very effective braces as well as connecting plates between legs and girts.

The inside of frame A, A, is covered by a plate of cheap tank steel about three-eighths of an inch thick. Thinner metal would have answered but the man who built this bench wished to have it solid enough to carry almost any load without "sagging" down in the middle. Therefore, he watched his chance and procured a piece of tank which was being broken up. The bottom of the frame was cut out in a few minutes with an oxy-acetylene cutting torch.

A "Bumped-Up" Bottom.

To still further prevent, or to prevent the bench from sagging under loads of heavy castings which might be placed together for welding, on top of the bench, the steel plate was "bumped-up" in its center, G, for about an inch in height. To do this, the plate was placed flat on an anvil and held there securely while two men with sledges played a tattoo on the upper surface of the plate as it laid fair and flat upon the anvil.

The effect of thus hammering the plate while laid and held upon a solid surface, was to stretch the middle of the plate (the edges were not hammered), they remained the same, which jumped up to make room for the increased surface area.

Care was taken that the plate "puffed" all on the same side and when the center had been dished a little more than an inch, the plate was turned upside down and laid inside of the bench frame.

A little more hammering was necessary to make the plate lay fair upon the sides of the frame but this was finally accomplished, then some fine dry sand was placed on top of the plate and the brick paving laid in place and well rammed down. The bench was then ready for business, and castings, broken into two or more pieces could be placed together upon the brick paving, wedged up into position for welding.

A bit of a "cob-house" built around the parts to be preheated, using bricks therefor, then the heating would be done, the bricks carefully removed as necessary and the welding done, without moving the casting from its position, at least not until the several parts had been securely "tacked" together by the oxy-acetylene flame and were practically one piece again.

Individual Motors and Lights.

In the shop where the welding table was used, there was, besides the bench lathe, one which would swing 20 inches, a fine tool, capable of doing about anything which any lathe could handle. They also had an air compressor of large capacity, big enough to supply air as fast as it ever could be used in that shop. As the compressor was large, only a comparatively small storage cylinder had been provided. As the compressor and all the other machine tools had each been provided with an individual electric motor a large air storage capacity was not necessary.

But, as stated, each and every machine had its own motor, the drill had one, and even the little bench drill

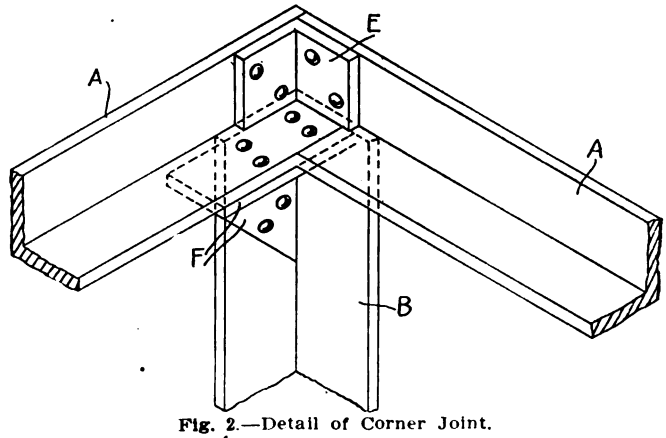


Fig. 2.—Detail of Corner Joint.

was driven by a small motor and had still another motor for driving the overhead grinding roll as mentioned above.

A peculiarity of the electric light arrangement in this shop was that in addition to the usual overhead and wall lights there was one incandescent lamp at each machine,

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attached to the end of a stout "flexible," which was so arranged that the lamp was normally kept right where it was at all times convenient to the hand of the machine operator.

For instance: One of the lamps was hung to the belt shifter of the 20-inch lathe; another lamp hung from a hook which had been fastened securely to the drill press housing through which the drill spindle moved. The lamp at that point could be grasped by the fingers of the left hand almost instantly, removed from its hook, carried to the point where light was needed—"badly and P. D. Q.;" then the lamp could be as quickly returned to its hook again. These lamps were all enclosed in wire cages so they might be laid down anywhere, on floor or on the work, as required.

Service Work.

In this shop they made a specialty of service work, and their superintendent, Mr. A. Hulman, submitted that commercial cars particularly were their aim and "hobby." "It is a fright," said Mr. H., "how some—yes, how many, and even most of the commercial cars—are run. They are sent out in any old condition, and it seems as though the owners were perfectly satisfied as long as the cars will run. Just as long as the engine will turn over, nothing is done to the machine, and the rattling abominations heard on every hand in our business streets are the results of commercial car neglect, or, perhaps I should say, lack of care.

"There is no reason why each and every commercial car should not run as quietly and as noiselessly as a passenger car—no reason save the neglect to keep the mechanism in proper condition to run quietly. Now, we

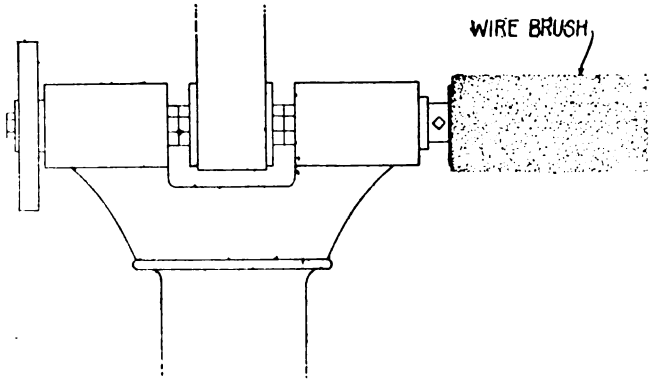


Fig. 3.—A Wire Brush Is a Great Utility Machine.

propose to take care of commercial vehicles the same as other garages take care of passenger cars, and to see that cars cared for in this garage will run with 'decency and quietness,' as the old lady said about the college boys."

Life of Commercial Vehicles.

"Commercial cars wear out too fast," continued Mr. Hulman, "just because the cars are not properly taken care of. The cars which are cared for in the Commercial Service department of this garage outlast any of the cars which are running around without service attention, and users of commercial cars are beginning to sit up and take notice of that fact. We have demonstrated the fact to them so strongly that there is no getting away from it, and I venture to state that within a very few years commercial cars will all receive regular service work, and that the city authorities will awaken to the fact that a rattling commercial vehicle is a nuisance and an unnecessary one at that, which will be fined or otherwise penalized whenever or wherever it may appear in public to the discomfort of our fellow citizens."

The Useful Wire Brush.

One very uncommon tool to be found in a garage was a revolving wire brush. This tool, which was about 10 inches in diameter, was placed upon the spindle of an ordinary grinding double wheel stand. One of the grinding wheels had been removed and the wire brush put in its place. The uses found for this very convenient tool were many and varied. Daily new uses for it were constantly coming along, and the revolving wire brush bids to be the most popular machine in the shop.

For removing a bunch of dirt or a patch of rust from a bit of machinery, the revolving wire brush will accomplish as much in five seconds as a man can do in fifteen minutes with scratch-brush and scraper! The effective and speedy manner in which the wire brush will do its work must be seen to be appreciated.

Supply Room and Office.

This garage has worked a scheme which is particularly well adapted for use in warm localities, but which may also be used to great advantage in snow and zero places as well. It is usual, in garages and shops, where store rooms and offices have been partitioned off, to find the spaces thus set aside to be so warm and ill ventilated that it is only with great discomfort that anybody can stay inside the stuffy places thus isolated.

But in this Mississippi Garage there were no ill-ventilated places where the temperature seemed high enough to spoil a rubber tire or to cook an egg. But, all the same, the required spaces were partitioned and even securely locked, without stopping in the least the circulation of air, light or heat. The partitions were made in the usual manner, of scantling, 2 x 4 inches and 4 x 4 inches, spaced fairly closely together, with one laid upon the floor, another placed against the ceiling, with the necessary number of studs and girts cut in between.

But, right there, the usual procedure stopped. Instead of being covered with sheathing, the studs and girts were covered with wire cloth, of a variety resembling "poultry" netting, only the wire seemed to be stouter and stronger—better able to withstand rough usage. This partition material let light, air and heat pass readily, and furthermore, things could be seen and heard without going into the rooms which might have been partitioned off.

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Beneath the Dollar Sign

He Who Can Laugh at His Own Misfortunes and Smile Away His Griefs Can Always Keep His Wallet Filled.

$$$

A camel can go eight days without a drink but remember your radiator is not built that way.

$$$

Possibly you can buy lubricating oil at half the price you are paying—but while you are about it, why not use water? It costs less and the bearings will be destroyed just as quickly.

$$$

Rubber side curtains and tops can be folded into a small space—so can a derby hat—but it isn't always best.

$$$

A tire, a cut, three drops of oil, and a blow-out, are four acts in a farce that makes the accessory salesman smile and grow wealthy.

$$$

A proud motorist boasted that he never had to replace the oil in his engine base—he was right—he replaced the engine instead.

$$$

A witty reader writes: "We have a new Storage Battery **Charging** Station in this town—the sign is right, they charged me four dollars for my battery, now it won't work at all." You and your battery were both "over-charged," make them change the sign.

$$$

A "wobbly" front wheel is like a drunkard—it wastes the money.

$$$

Front wheels are usually bow-legged; but never should be cross-eyed.

$$$

If the bottom of a storage battery case interests you to the extent of five dollars, turn it over, otherwise keep it right side up. An inverted battery is as useful as a quart of steam, and just as lasting.

$$$

Of course you haven't thought of it before, but an electric cigar lighter would make a dandy Christmas present for the "Old Man;" and, wouldn't it look nice on his car?

$$$

Do you make a careful examination of the steering gear on your car every week or do you prefer to let the coroner investigate the trouble?

$$$

Dear Editor—A friend advised me to mix sawdust and heavy grease for my transmission to quiet it. Now I can't turn the gears over and the engine won't run; what is the cure?

You must be hard to satisfy; your transmission is quiet, isn't it? You can't cure the transmission but you might buy a new one.

$$$

A car on the road is worth two in the bush.

$$$

You never miss the chauffeur till the car runs wry.

$$$

You wouldn't think of using a ten pound sledge hammer to drive a tack; then why should you use an 18-inch wrench to tighten a timer bolt?

$$$

Carbon deposits in an engine are just like the kaiser; you must drive them out entirely or your engine will never run smoothly.

$$$

If your chauffeur races your engine you can assume that he has a friend in the repair business who is looking for an overhaul job.

$$$

Repairmen should always ask their customers if they read the Automobile Dealer and Repairer before they try to charge a day's time to adjusting a carburetor. We keep our readers informed.

$$$

Even a pulmotor and a gas mask won't save your life if you run your engine in a closed garage with no ventilation.

$$$

A punctured tire is an incident; a cracked windshield is an accident; and a broken steering gear is a funeral.

$$$

Don't sneer at your neighbor's car when you pass it on the good road—he may give you his dust on the next hill.

$$$

The man who is always knocking some one else's car is usually being knocked by his own and is looking for revenge.

$$$

Oh, you won't get home until morning—if you let your car run dry.

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Automobile Dealer and Repairer

A Magazine of condensed and compact information for busy readers.

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Member of the Associated Business Papers.

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MISSING NUMBERS—Our readers are requested to remember that we are always pleased to re-send numbers which have gone astray in the mails.

MAY THE WORLD BE ILLUMINED BY THE LIGHT OF LIBERTY

There Is a Silver Lining to the Cloud of "No Automobile Shows"

THE National Automobile Chamber of Commerce has decided not to hold any of the usual large automobile shows this coming winter and spring.

The decision is wise and patriotic and right in line with the universal spirit of sacrifice and conservation, which is necessary for winning the Great War.

This magazine has always supported the large shows at New York, Chicago and Boston, not only by exhibiting and demonstrating in good space at the shows, but also by bringing out special show numbers and using our reading columns to give these shows suitable publicity. We have always believed in the "get-together" spirit, which has made the great national shows possible, and we regret the necessity of doing without them.

Nevertheless this cloud, like most others, has its silver lining. Show advertising has its merits, but the benefits obtained are largely of a general and indirect character

Nearly all good advertising experts will agree that trade journal advertising wisely placed is far superior to show advertising, when it comes to tangible returns in the shape of inquiries and orders.

Manufacturers of accessories will this year be saved a large expense, which is always involved in being properly represented at the big shows. The money usually expended by such manufacturers at the shows, may well be devoted this season to the purchase of good display advertising space in a carefully selected list of trade mediums.

For example, the expense of even a moderate sized booth in the New York and Chicago shows, including traveling expenses, salaries of attendants, freight and express shipments, etc., would be enough to purchase a whole page of advertising space in this magazine for one year.

With the great curtailment and possibly the entire cessation in the manufacture of new automobiles, it is more essential today, than ever before, to advertise auto accessories among dealers, repair men, public garage owners, and car owners. With over four million five hundred thousand cars in use, there is unquestionably an ample market for every accessory manufacturer, but advertising is absolutely necessary to reach this market.

With no show expenses necessary for the coming season, manufacturers will be able, without undue financial strain, to carry the greatly enlarged amount of trade journal advertising, which they actually need and must have to keep the wheels of business moving under war conditions during the coming season.

How Our Readers Can Show Their Appreciation of Our Magazine

THIS magazine is very fortunate in one respect. We have built up an amount of appreciation and even affection among our readers, which is very unusual for any trade publication.

There is seldom a day in this office that we do not receive letters from automobile dealers, repair men or car owners, in which it is stated that these subscribers are more than satisfied with the Automobile Dealer and Repairer on account of the useful information given of a practical nature. Sometimes a reader writes us that he has received information in a single article published in our magazine which has been worth to him ten times the subscription price, or even more than that.

Of course these tributes are extremely gratifying. They warm the "cockles" of the editorial heart and give us fresh courage to continue our present editorial policy and even encourage us to make additional improvements in the quality of our reading matter.

Nevertheless, we want to point out to our readers that they can show their appreciation in such a way that it will benefit us far more than they can possibly do by means of a complimentary letter.

There is an old proverb that "fine words butter no parsnips," and of course it is true that praise and encouragement will not directly contribute to the financial support of this or any other publishing enterprise.

If our readers really want to help us, they can do so in the best possible way, by taking special pains to answer the advertisements published in this magazine, but to make their help effective, they must do even more

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than this; in writing to these advertisers they must mention the fact that they saw the announcement in the Automobile Dealer and Repairer.

The very life and bone and sinew of any magazine is in the advertising columns, and if we did not have this advertising support, it would be impossible for us to give our readers the information that we now furnish, except at a price of not less than $10.00 per year, and perhaps it could not be done even at this price.

Under war conditions, the automobile accessory manufacturers have been largely deprived of the patronage which they enjoyed before the war from large equipment orders received from manufacturers of accessories.

These accessory manufacturers must therefore look to the dealers, repair men and car owners for the marketing of their products and one object of publishing this magazine is to put these accessory manufacturers in touch with the classes named.

Every time you write a letter to any advertiser in our magazine requesting him to send you a catalogue or asking him to quote prices on his product, you are helping us more than you can in any other way, and of course if you can send actual orders to our advertisers, that is better still.

This editorial is intended as a strong plea to every reader to constantly bear this point in mind, by buying from our advertisers and writing them letters in response to their advertising.

If readers have time, we are glad to receive their complimentary letters and we appreciate them highly, but answering advertisements and mentioning our magazine will help us even more. Will you do it?

Strangling Business is a Serious Matter; We Must Increase Production to Win

IT is fortunate there is a prospect of the war being brought to a close next year. If we go on crippling or closing up industries by declaring them non-essential, in another two years our finances will be in a deplorable condition. There would be few outside of war material manufacturers to pay taxes or buy bonds. It is not conceivable that enough could be squeezed out of these industries to meet the needs of the Government or come anywhere near it. To pay taxes and at the same time to live, people must be permitted to make profits.

Instead of depriving manufacturers of raw material with which to do business, steps should be taken to increase the raw material and to increase the output of coal. To stop production of so-called non-essentials for any considerable period of time would come pretty close to being financial suicide.

Keep drawing from a barrel at the spigot and allow nothing to flow in at the bunghole and it is only a question of time when the barrel will be empty. It requires no profound financial knowledge to understand such a simple proposition as this. It is as plain as daylight, but some of our fantastic financiers in Congress do not seem to comprehend it. We are raising money by taxation by billions and spending it like water, and at the same time hampering the legitimate industries of the country.

To win the war requires money as well as men, and people must be permitted to make profits or they cannot pay taxes or buy bonds.

The House of Cards Will Tumble on Your Head if You Don't Advertise

THE general consensus of opinion among advertisers at present is that advertising is not as necessary as it was before the industries devoted their time to war work and for that reason the first department to suffer from the pruning knife of retrenchment is that of advertising.

A feeling of optimism pervades the manufacturers. Why should they plan for the future? Are not their factories filled with war orders? Are they not working overtime? Is not their production less than the demand?

Yes, it is now, and they are safe IF the war continues indefinitely.

But there is an IF which qualifies the fortune and those optimistic manufacturers may find the balloon of fortune punched full of holes if they don't watch out.

As soon as the war ceases, the stream of war orders will as immediately stop and the market will be flooded with the unused excess products. The dream-house of cards will tumble and the manufacturers whose products are not known to the automobilists will find themselves with expensive equipment and storehouses full of goods —but no market; truly a sad outlook.

From the smallest grocer to the largest automobile manufacturer, business depends directly upon good-will If the public know a product, and are sure of its value—they buy it. They patronize the grocer because they know he is honest—they know it by experience and because they know the man himself. They buy well-known products because they have seen them advertised.

The public is a fickle lover—"out of sight out of mind" —applies to their regard and the manufacturer who has allowed his product to be forgotten might just as well resign himself to the idea of spending millions of dollars in order to get his product before the public again, for he will be confronted by keen competition after the war.

The advertiser must not feel that the public will take his products just as eagerly as they did in the past when every magazine and paper carried their copy. His competitors are now the public's friends and he has been forgotten. The good public doesn't even know he is in business, they are fully satisfied with the other product and will continue to use it unless his advertisements are twice as large and convincing as the other fellow's.

If you, Mr. Advertiser, will only think this over, you will see the logic of it—so "get busy" and don't let yourself get "put on the shelf" of the public's opinion.

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This department is maintained for the protection of our readers—especially our reckless readers, if we have any.

The object is to encourage every operater of a motor vehicle to be careful and avoid accidents, especially the inexcusabe accident of a collision at a railway crossing.

BOY killed; skull fractured; arm broken; three people fatally injured as car"—etc., etc. We read these items in our daily papers without a shudder and we pass over them without giving them any more thought than the death of a couple in a distant country town; they don't concern us and anyway they are probably to blame. Who the "they" are, that are to blame, matters not.

But all at once you are involved in an accident which, of course, is terrible. Perhaps your arm is broken; perhaps it is your child that is killed; then you wring your hands and call upon the powers that be, for revenge and a quick punishment of the criminal.

You call upon all your friends and neighbors to protest with you for justice, to add their wails to yours. You, who have always coolly looked upon the griefs of others, feel that your troubles are public calamities, and call upon the world for sympathy.

Begin your sympathy campaign now, before the accident. Make yourself a committee of one and try to enlist others in a league for the Prevention of Useless Accidents. If your neighbor is a "speed bug," puncture his tire or steal his car—don't let him run over your son or wreck your car. Be your brother's keeper and do your part to prevent accidents. Join our "Life Saving Department."

Killed by Joy Rider: On the second of this month an old lady of New York was instantly killed by a joy rider who was operating his car at excessive speed. The driver of the car had taken it from the garage without permission of the owner and was operating it upon the left side of the street.

Ran Into a Curb: Two people were badly injured when an automobile in which they were riding crashed into the curb at Park Circle, Baltimore. The accident was evidently due entirely to carelessness. Investigation showed that the chauffeur evidently was not paying attention to his business.

Driving in Car Tracks: On the 6th of this month a woman in the back seat of a limousine was badly cut by broken glass when a trolley car crashed into the back of the automobile. The street at the point where the accident occurred was poorly lighted and the machine was not fitted with a tail light. The motorman claimed that he did not notice the machine in the tracks ahead.

Car Skids Through Bridge: In Cherokee, Iowa, recently, a boy was injured and died shortly after when an automobile in which he was driving crashed through the railing of a bridge. The accident was caused by skidding on the smooth planks of the bridge. The boy was pinned beneath the machine when it fell. A companion was but slightly injured and will recover. The car was being driven at a high rate of speed.

Victim of John Barleycorn: While driving a car at a normal rate of speed, a prominent business man of Atlantic City early this month killed a pedestrian who was staggering along the road. Witnesses said that the victim staggered directly into the path of the machine.

Hurled 40 feet Through Space: A reckless joy rider in New Rochelle recently killed an aged man and then ran away. The car was being driven at a high rate of speed and when hit, the 83-year-old victim was hurled 40 feet through the air, practically every bone in his body being broken. A witness said that two cars were racing, which accounted for the excessive speed.

Climbs on Sidewalk: An eight-year-old boy was crushed beneath the wheels of a motor truck last month when the machine, recklessly driven, climbed over the curbing on to the sidewalk. In addition to the victim, a number of other children and two women were badly injured. This accident occurred in New York City.

A Lenient Magistrate: The driver of a motor truck of Shreveport has cause for thankfulness in that the magistrate did not impose a fitting fine. The driver plead guilty to a charge of reckless driving and an accident in which he had run into a man as he was boarding a street car. He did not have a license and had just purchased the truck, yet he was fined only $50.

Woman Hit by a Machine: "I blew my horn and she wouldn't get out of the way so I ran into her," said a driver of a machine in New York, in defense of himself after having injured an aged woman in that city. Reports did not say whether or not the driver owned the whole town.

Killed at Crossing: An automobile truck loaded with wheat for a grist mill was driven directly in front of a steam locomotive at Washington, D. C. Although the engineer had given sufficient warning the operator of the truck seemed to think that he could get across the track before the engine arrived. Both the driver and one passenger were killed.

Passed Car on Wrong Side: An automobile driver of Buffalo recently knocked down and killed an aged woman who was crossing the street. Contrary to law, the driver passed a standing street car, which was discharging passengers, on the wrong side.

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The Metal Turning Lathe

Part 3—Cross Tool Post Feeds, Screw Cutting, Lathe Tools and Various Types of Tail Stock Centers Used for General Work.

J. F. SPRINGER

WE have now had enough, perhaps, of the regulation of the speed of the lathe in order to meet the requirements of the metal in the work and the cutting tool, so let us give some attention to the management of the speed of the longitudinal feed.

When screw threads have to be cut, it is very necessary that, as the work turns, the tool be moved steadily lengthwise. For example, suppose we have to cut a screw thread having ten convolutions to the inch. This means that the tool that does the cutting shall be moved lengthwise of the work at such a rate that 1 inch will be covered for every ten turns of the work. There are perhaps a very few men who can make some kind of a screw thread by just depending on their nerve and steadiness and good judgment.

The way to cut a screw thread is, however, to put little or no dependence in these things for securing the proper regulation, but to make use of the lead screw of the lathe. This is a long screw arranged along the front of the lathe. The carriage which shifts along the lathe bed and which carries the tool post may be put in mesh with the lead screw. When this is done, one turn of the lead screw moves the carriage forward or backward one pitch of the lead screw.

Meaning of "Pitch."

The distance meant is the distance from the middle of one thread to the middle of the next thread, care being taken to measure parallel to the axis of the screw. A lead screw may have, say, six threads to the inch. The pitch is, in this case, exactly 1/6 inch. In order to cut a screw thread on the work, it is necessary to control the lead screw by the lathe spindle. That is, it is necessary to connect the two in such a way that when the spindle turns once the lead screw will advance the carriage precisely the right distance.

Take an easy example first. Suppose we want to cut 12 threads to the inch on the work. This means that the carriage must move forward exactly 1/12 inch every time the spindle turns round. If the lead screw has a pitch of 1/6 inch, then it will advance the carriage 1/12 inch in one-half of a turn. Consequently, what we have to do is to arrange matters so that one forward turn of the spindle will bring about one-half forward turn of the lead screw.

Now the spindle and the lead screw are parallel. In order merely to get the lead screw to rotate half as fast as the spindle, we have merely to put a spur gear on the spindle and arrange in mesh with it a second spur gear of double the size, this second gear being mounted on the lead screw. When this has been done, one turn of the spindle will bring one-half turn of the lead screw. This is at least part of what we want. We want in addition that the lead screw move the carriage in the proper direction, since we don't want to cut the thread backwards.

It is easy enough to reverse the direction of the rotation of the lead screw without changing its speed by putting an idle spur gear between the one on the spindle and the one on the lead screw. We don't even need to be careful as to the size of this intermediate gear. If the gear on the spindle is half the size of the gear on the lead screw then whatever the size of the intermediate gear the spindle and the lead screw will both rotate in the same direction and the latter will rotate at half the speed of the former. So much for this easy example. The matter is, however, of such considerable importance that it will be well to go somewhat further.

Suppose then that with the same lead screw it is proposed to cut a thread having 23 convolutions to the inch. What we have to do is to cause the lead screw to advance the carriage 1/23 inch during one turn of the spindle. The first thing we settle is this: How much of one turn of itself will the lead screw have to rotate to yield an advance of 1/23 inch? In one whole turn we get 1/6 inch. As many turns will be required as 1/6 is contained in 1/23. Dividing 1/23 by 1/6 we obtain 6/23 turn. We now have this result: For one turn of the spindle we must get 6/23 turn of the lead screw.

This is the same thing as saying that for 23 turns of the spindle we must have six turns of the lead screw. We can readily see that this is right. When the spindle has turned 23 times we should, for a thread having 23 convolutions per inch, have the carriage advance exactly one inch. This is just what it does in six of its rotations. So, then, we want a gear on the spindle and a gear on the lead screw such that 23 turns of the former will force six turns of the latter. If there are six cogs on the spindle gear and 23 cogs on the lead-screw gear, we shall get this result, for the reason that 23 turns of a six-cog gear will equal six turns of a 23-cog gear.*

From the foregoing, we get the following simple rule: Put on the spindle a gear having just as many cogs as the *lead screw* has convolutions to the inch, and on the

*A gear with only six cogs may seem objectionable. We can, however, double or treble the number, provided we double or treble the cogs on the lead screw gear. Thus, with an 18-cog gear on the spindle and a 69-cog gear on the lead screw, we will get the very same results.

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lead screw a gear having as many cogs as the *proposed screw thread* has convolutions to the inch.

Learn This Important Rule.

This is a very important rule and should be thoroughly mastered. It will not be difficult to apply, after it is once comprehended. It is probably as simple a statement of what has to be done as it is possible to make. One or two points need attention. I can bring these out very well by means of examples.

Suppose the lead screw has eight convolutions to the inch and that you desire to cut a thread having 20 convolutions to the inch. According to our rule we put an eight-cog gear upon the spindle and a 20-cog gear on the lead screw. Let it be noted that both 8 and 20 are divisible by 4. Accordingly, we could use a two-cog gear on the spindle and a five-cog gear on the lead screw if we had such gears. A two-cog gear is, however, a ridiculous thing. So then we take some multiple of 2, as, for example, 16, 18, 20, 22, etc. The number of cogs for the lead-screw gear would be 40, 45, 50, 55, etc. In short, any numbers will do for the cogs of the two gears, provided only that they are in the ratio 2 to 5.

Take another example. Suppose we have a lead screw

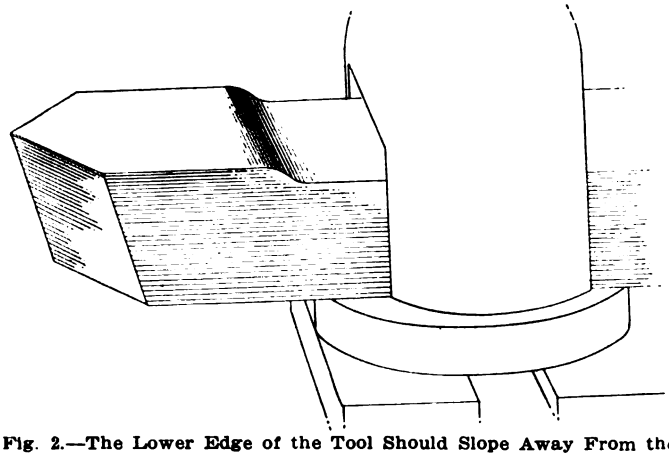


Fig. 2.—The Lower Edge of the Tool Should Slope Away From the Work. This Tool Shaped for 60° V. Thread.

with seven convolutions to the inch, and desire to produce a thread with 5½ convolutions to the inch. We may, in such a case, use 2 inches for the standard, when the problem will be 14 convolutions of the lead screw to a 2-inch length and 11 convolutions of the proposed thread to a 2-inch length.

We follow our rule. On the spindle we put a gear having for its number of cogs, 14, 28, 42, etc., and on the lead screw a gear having for its number of cogs, 11, 22, 33, etc.

We could have gone ahead without bringing in the 2-inch standard length. That is, we could have applied our rule at once. In that case we should have required a seven-cog gear for the spindle and a 5½-cog gear for the lead screw. In order to get rid of fractions, we convert the numbers into 14 and 11, which is permissible since we have not altered the ratio.

In all this, we must not forget the intermediate gear, which is used to make spindle and lead screw rotate in the same direction. However, in changing gears to get the proper ratio for our screw-cutting, we may need to change the intermediate gear. The reason for changing it has nothing to do with the ratio. *The intermediate gear has no effect on the ratio.* A change may be needed, however, to put it in mesh with the gears on spindle and lead screw.

The thread-cutting too will naturally have its forward edges possess a small deviation from the vertical. Let them slope, then, slightly. in the general direction of the tool post as one looks down from the top face of the tool. This slope is needed for clearance. Aside from this provision for clearance, the tool front should have the same horizontal section all the way down. The front faces should be accurately shaped and ground to secure this. When this is done, the regrinding of the tool from time to time as it dulls will be simplified.

Cutting Tools.

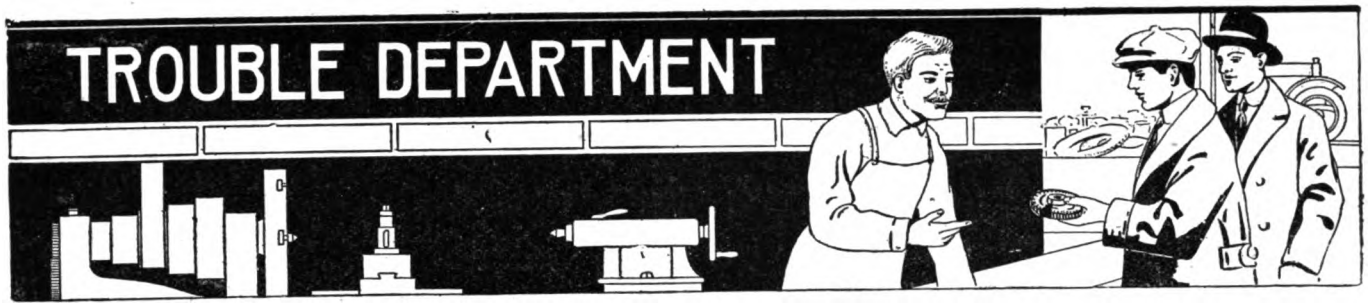
In cutting screw threads, we use a tool whose nose is shaped on top to the exact size and form of the thread desired. This needs considerable explanation. The thread-cutting tool should be absolutely flat and horizontal on top, at least in the region of the nose. When this tool is adjusted in the tool post, it should be set so that the flat horizontal surface is really horizontal and at the exact level of the axis of the work. The top of the nose of the tool will then be in an axial plane of the screw that is to be. Its form and size should be exactly the form and size of an *axial section* of the desired screw when finished.

This tool will be moved forward lengthwise of the lathe by the lead screw. It will also be moved transversely to the lathe. This movement—the transverse feed—is ordinarily produced by turning the feed screw on the tool post. This is done by means of a hand wheel or a suitable crank.

We are now ready for an important point. There is only one feeding movement in cutting screw threads. The forward movement controlled by the lead screw has no effect on the cutting of the chip. This movement alone would result in no cutting. The chip is started and kept going by the feed through the tool post. The feeding then, in so far as the cutting of metal is concerned, is a hand-regulated operation. The responsibility rests entirely with the operator. All the cutting that is being done is being controlled by his right hand. A full understanding of this will surely make the operator pay rather more than ordinary attention to the transverse feed.

The thread, or perhaps I should say groove, is cut all over its surface at one time. The groove may be just begun and therefore shallow; or it may be deep and nearly to full depth. Either way, the tool cuts at both sides and in front simultaneously.

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Differential Trouble.

2513

From J. J. Riess, Michigan.—I have a Buick Roadster, Model D-6-44, year 1918. Last week it started to grind when I shifted into high gear, but had never troubled me that way before.

When running at speeds between 15 and 35 miles per hour on high gear the grind is noticeable, but not on other gears or at lower speeds. I took the machine to a garage, and upon disassembling the rear axle the repair man found that the nut on the end of the driving shaft was badly damaged. I had him put in a new drive shaft and a nut, but the grind still remains, though the gears seem to be in good condition. Can you suggest the remedy?

Reply.—There are a number of possibilities for your trouble. In the first place we should advise you to clean the differential by removing all the grease and soaking the gears in kerosene oil. Then see that the small drive gear is not loose upon the shaft.

From what you say we would infer that the driving shaft has a certain amount of end play. That is, it slips downward far enough so that under certain conditions it will hit the differential housing. There should be no end play in this shaft. Next, be sure that there is no side play in the differential. Be sure that the differential is tight upon its bearings. Then examine the two gears and see if they are properly adjusted. The backs of the gear teeth should be together.

See if the nut on the end of the old drive shaft still hits the differential housing. Since the differential housing has been damaged by the old nut, it is very possible that it has been thrown out of line or that it has some projections that still interfere with the driving shaft. In any event, before you can make a proper examination, you will be obliged to remove all of the dirt and grease from the differential.

Fuel in Crank Case.

2514

From J. C. Bohl, Ohio.—I own an Overland car, 1916, which is giving satisfaction, except that during the cold weather there is trouble with the crank-case filling with something besides oil. As soon as the temperature drops I notice the oil gauge begins to creep up.

I have just had the carbon removed, the valves ground and the repair man says that the cylinders are in fine shape, the engine pulls well and starts easily, and I have cut the gasoline down as much as possible. Can you tell me the trouble and remedy?

Is it necessary to remove the head to replace push rod and valve guide bushings?

Reply.—Your trouble with the crank case filling that contains fuel is a common one. We published a number of articles dealing with this situation some few months ago. There is a strange inconsistency in gasoline engine action. In case of low compression the fuel will leak into the base. The same thing is true where the compression is excessive. The trouble is augmented by low temperature. There is but one remedy we know of to prevent this.

If your engine gives satisfaction in the warm months of the year, your trouble is undoubtedly due to poor vaporization. Install a larger hot-air stove or put in a new carburetor of the latest type. If it is possible for you to purchase a combination intake and exhaust manifold for this car, this will also help to solve your problem. The whole answer lies in increasing the heat along the manifold or carburetor line.

It will probably be necessary for you to remove the cylinder head in order to replace the valve stem and push rod guide bushings. At any rate, it will be the best plan because then there will be no danger of damaging the casting, and you can replace the bushing and ream it to fit the push rod much more conveniently than while it is on the machine.

Loud Hum in Transmission.

2515

From G. H. Pike, Massachusetts.—After having had my Ford car overhauled I have driven it over some very bad roads, often running for a mile or more in low gear. Apart from a few small troubles, the only thing I find that bothers me is a loud hum in the transmission, sometimes almost a roar. It seems to come from the rear axle at times, and is noticeable only in high speed. What is the trouble?

Reply.—We have never heard of a trouble such as you mention. Usually the hum, such as you speak of, is caused by improperly adjusted differential gears. We would advise you to make sure that this is not the trouble before you invest very much money in repairs. It is an easy matter for you to find out whether the trouble is in the gear-set or in the rear axle.

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First, jack the car up and stand it firmly upon boxes or horses, then remove the rear axle from the car and start up the engine. Throw in the high speed clutch and see if the humming noise still proceeds. If so, it is in the gear-set. Otherwise it is in either the differential or in the driving shaft.

We cannot see how a humming noise could be caused in the transmission with the high speed clutch in, unless there is a loose member in the magneto. The only way to find the trouble would be to disassemble the unit in which the hum was located, and in case it is in the transmission, we should advise you to consult with a garage man. The only chance for anything of this kind is that something is dragging against the magneto or against the clutch cones in the transmission. You may be able to find this yourself by removing the covers of the gear set and inspecting it carefully.

We are very sorry that we cannot give you further assistance, but such a trouble is very difficult to diagnose unless one has seen the car.

Scored Rear Cylinder.

2516

From S. G. Miller, Nebraska.—I have a Hupmobile 32 that is giving me trouble. The spark plug in the rear cylinder soots very quickly, due to oil leakage. I have had new piston rings installed and the valves ground, but it did not make any difference.

What causes the engine to "jerk" when running on high speed at low car speed? How can I adjust the pinion driving gear? How can I put in a new disc clutch?

Reply.—It is very possible that the rear cylinder of your engine has been scored or badly scratched, and that the lubricating oil passes from the base into the explosion chamber.

Remove the piston and examine the walls and be sure that they are not damaged. Then make a series of careful measurements to determine whether or not the cylinder has been worn slightly egg-shaped. If you find that the walls are intact examine the piston rings and see that the clearance between the ends is not too great. Possibly when you fitted the rings you were not careful enough and they may not contact their whole circumference.

The only way that a piston ring should be fitted to get satisfaction is by the Prussian Blue and scraping method. Coat the inside walls of the cylinder with Prussian Blue and slip the piston ring mounted upon the wooden piston into place. Scrape off the high spots which are evidenced by deposits of the blue until the piston ring contacts with the cylinder all the way around.

See if you cannot cut down on the gasoline slightly. Perhaps you are using too much fuel. It is also possible that the same reason for jerky engine action can be traced to the source of trouble of carbonization. If the engine cannot be throttled down to a normal idling speed, there is evidently some leakage of air between the carburetor and the cylinders around the spark plugs or around the valve covers.

Make all joints tight with a mixture of graphite and lubricating oil, mixed to a thick paste. With the engine running at the lowest speed possible, squirt some gasoline around each of the valve stems in turn and note the effect upon the engine. If the engine speeds up or slows down, it is evident that there is a leak or there are leaks around the valve stems. In this case you will be obliged to replace the valve guides.

The replacing of the disc clutch is too large a job for you to undertake yourself. You will be obliged to disconnect the propeller shaft at the universal joint in back of the transmission gear-set, remove all of the control rods, wiring, etc., and lift the engine together with the gear-set out of the frame. Then disconnect the gear-set housing from the engine at the flywheel housing. You can then remove the gear-set and expose the driven clutch member together with the small clutch springs mounted upon the outside of the driven clutch member.

As soon as the spring retaining nuts have been taken off and the springs removed, the clutch may be pulled from the flywheel and the discs taken out and replaced. Should you attempt this job yourself you would be very apt to damage some of the engine parts. Only a shop that is equipped to lift the heavy units from a frame should attempt such an extensive repair.

Peculiar Grinding Noise.

2517

From C. D. Schwine, Alabama.—I have a Studebaker 6—1918 model. It runs well and has plenty of power but there is a loud sing or hum when the car is running faster than five miles per hour. The noise seems to come from the timing gears, just to the right of the engine. Repair man cannot seem to locate it, can you help?

Reply: As you describe the noise in your Studebaker car, we are inclined to think that it arises from the starting motor clutch or ratchet in the timing gear case, or from the generator. Very frequently, a hum such as you mention can be traced to brush trouble or the commutator in the generator.

Examine this unit and see that the brushes fit the commutator and be sure that the mica segments on the commutator do not extend above the copper segments. We would advise you to remove the front of the timing gear case and inspect the starting motor ratchet. This ratchet is fastened to the crank shaft with a left hand thread and may be removed with a large wrench by turning it towards the left while the flywheel is being held by an assistant. When the ratchet is removed the starting clutch is exposed for examination.

It is very possible that the clutch is not receiving sufficient lubricant or is badly worn. Notice whether or not the starting motor is operated while the engine is running. The starting motor chain should remain still ex-

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cept when the unit is being used for starting. If the unit runs with the engine the humming noise is due to the chain and to prevent it from running, the starting clutch should be repaired.

If you are still unable to find your trouble after following the above directions let us hear from you again. Be sure to give all details.

2518 **Oakland Model 42 Wiring.**

From L. E. Harris, New Hampshire.—Your journal has given me much useful information and now I am looking for more.

I am driving a Model 42 Oakland touring car, year of 1913, which is equipped with a dual ignition system consisting of dry cells and a Delco system. I have never had a particle of trouble with the ignition until recently when coming home one evening, in coming up a hill the car suddenly began to jerk and jump and lost its power entirely. I managed to get up the hill in second speed and got home but the engine worked very poorly.

I found that it works all right on the cells, which shows that the trouble is in the system, which gets current from the storage battery. The battery is in good condition and fully charged and the breaker points seem to be all right and the gap the right distance. There are two sets of breaker points, one for the storage battery current and one for the cells; a primary wire from a common post on the coil to a common post on the breaker box, a return wire on the coil to a common post on the breaker box, a return wire to the storage battery and one to the cells leading from the other two posts on the breaker box.

I find that with the switch on the cells circuit and the engine turned until the cam closes the breaker points, if I disconnect the return wire of the storage battery system from the post on the breaker box, a heavy spark jumps from the wire to the post or to any metal part of the breaker box housing if I touch it with the wire.

I do not understand why there should be any current on this wire when I am using the cells.

I have traced all the wires, cleaned all connections and put in new ones where they were poor, and although it runs much better it is not right yet and I still get the spark at the storage battery connection post on the breaker box. When it was at its worst I got a heavy shock when I pressed the horn button. There is a condenser for the storage battery current on the breaker box.

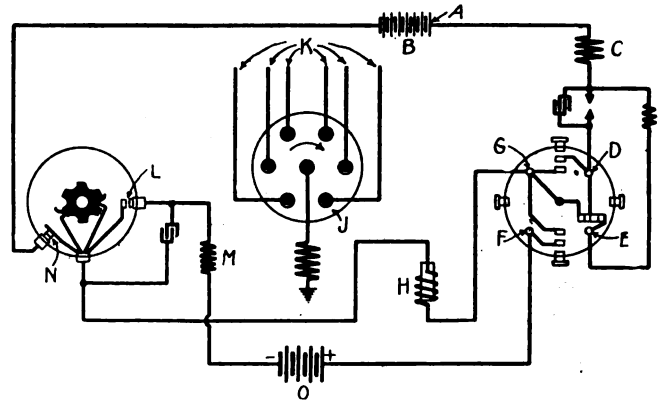
I am not much of an electrician but have covered the main points as I understand them. Although there is a heavy spark when I disconnect the wire at the breaker box it does not affect the running of the engine on the cells in the least. What do you think is the trouble?

Reply:—On your model 42 Oakland touring car, year 1913, there are two separate ignition systems and two sets of breaker points. If you will follow the wires through from the set of dry cells you will find that the current passes from the carbon terminal of the dry cells to the ignition relay, through this unit to the ignition switch and when the ignition switch is put upon the cell side, through this unit to the ignition coil, through the ignition coil to the common terminal on the breaker box, and when they touch each other, across them to the terminal, and thence back to the zinc pole of the dry cells. When the switch is thrown from the cell side to the battery side, the storage battery is used and the circuit is as follows:

From the positive terminal of the storage battery to the terminal on the ignition switch, thence to the ignition coil, through the coil to the common terminal on the breaker box, then to the storage battery contact and then through a resistance unit back to the storage battery.

This system is termed a two wire single coil system. One end of the secondary coil is grounded and the other end is connected to the center of the distributor box.

To test out this system proceed as follows: Throw the ignition switch to the off position, turn the engine over until both sets of contacts are together. Then remove in succession each of the wires from the breaker box and touch it to its respective contact point. There



Wiring of Ignition System on Oakland Car.

should be no spark in the system, if there is it is evidence of a grounded or short circuited wire.

Replace the wires with the exception of the wire leading from the zinc of the cells to the breaker box. Throw the switch to the cell position and you should obtain a spark at the cell contact on the breaker box. With your fingers hold the cell contacts apart and connect the wire to the cell contact point. Remove the wire leading from the coil to the center of the distributor and hold it about ⅛ of an inch away from the engine or the frame. Allow the contact to come together in the breaker box and snap them apart quickly. You should obtain a spark at the secondary wire. If not, there is some fault in the wiring. Trace it out. Replace the wire and remove the storage battery wire, that is, the one that leads from the breaker box to the resistance unit, thence to the negative side of the storage battery. Throw the switch to the off position and you should not get any spark at the breaker box. If you do there is evidence of a grounded wire or short circuit. Connect the wire to its proper terminal, hold the points apart with your finger, throw the switch to the battery position and try the same experiment of

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snapping the points together and apart rapidly to see if you get a spark at the secondary wire.

You will probably find that your trouble is due either to a wire broken inside the insulation, a poor connection, or a short circuited wire.

We produce herewith a diagram of the ignition wiring on this machine and trust that you will be able to locate the difficulty. If not, write us again, telling what you have done and we will try to help you further.

Ford Main Bearings.

2519

From James Quinn, Rhode Island—I have gained many useful hints from your magazine and now need a little help. I have a Ford car, 1917 model, which ran all right until the crank shaft broke. I replaced this shaft myself and in the course of the work, I discovered the cylinder block to be cracked. I had the block welded and the heat burned out the main bearings.

I tried to replace these bearings myself, but the babbitt I used was not as good as that in the engine at first. Would that make any difference? I scraped the bearings carefully and tightened them up until I could hardly turn over the engine. In addition to this work, I put in two new connecting rod bearings.

After the engine had been run about 50 miles it started to knock so I tightened the main bearings. It then ran finely for about 50 miles more when it began to knock again. I have talked with a garage man, who says that I would always hear that knock. Have you ever heard of a knock that couldn't be located and stopped? What is the trouble in your estimation?

Reply: We doubt very much if your trouble is caused by poor babbitt, although there is a possibility that you secured a soft grade of metal. You should be able to obtain the best grade of babbitt from Belcher & Loomis of Providence. The writer has used the babbitt used by this concern and found it to be excellent material.

Your trouble is probably due to the fact that you did not secure proper crank shaft alignment and as the bearings are at the present time out of line with the crank shaft, the crank shaft is probably sprung. You will be obliged to pull the whole engine out again and replace the babbitt bearings with new. Such a repair should not be attempted by anyone who is not accustomed to the work. The replacing of a main bearing is the biggest job upon the whole machine and we should advise you to forward the block together with the crank shaft to the Ford agency in Providence.

There is no company which manufactures bearings for a Ford car which can be applied in the way you mention. If in boring the babbitt bearings the shaft was not lined up within .003 of an inch, all of the connecting rods would be thrown off line and the engine would knock excessively. Proper main bearing repair is the only remedy. We have never heard of a knock in a Ford car that did not have a reason for it. We are very sorry that we cannot help you any further, but we are giving you the best advice in our power, knowing as we do the extreme difficulty of replacing main bearings.

No Spark From Magneto.

2520

From Benton Bragg, Alabama—I have a Flanders 20 car fitted with a Simms high tension magneto. After the car has stood idle for a few days, I cannot seem to get a spark until it has been towed very fast for a few hundred yards. After this is done, it runs all right and can be started easily until it has remained idle for a while.

Can you tell me the possible trouble and how to remedy it?

Reply:—In the first place you might examine the breaker points to see that they are smooth and flat and contact across their full face. If they are worn or pitted they should be replaced with new ones.

After they have been fixed so that they contact across their full surface, turn the engine over until the roller rides upon the top of the cam and the breaker points are fully separated. Then adjust this clearance or separation so that is is about .025 of an inch and not more than 1/64 of an inch. In all probability your trouble is due to the fact that the breaker points have worn badly and do not contact properly.

Charging Storage Battery.

2521

From C. D. Blalock, Oklahoma.—I would like to know if there is any way I can use a current reducer like that used for bell ringing and small electrical toys upon a house current line, for charging storage batteries? The current supply is alternating.

Reply:—You cannot use this device in combination with alternating current for charging a storage battery for the very reason that the current at the delivery end is alternating rather than direct. Such alternating curent can be used for running small toys and electric bells but is not suitable for charging storage batteries. The result would be a damaged battery and a burned-out current reducer.

Upset Storage Battery.

2522

From Max Jessup, Michigan.—I purchased a new storage battery recently and in some way all of the solution from the middle cell was spilled. Kindly let me know how to refill it?

Reply:—Immediately upon receipt of this letter we would advise you to take your storage battery to the nearest battery repair station, and have the faulty cell taken apart, cleaned and the electrolyte replaced. If you were to fill it yourself you would undoubtedly destroy it and ruin the battery completely.

This work can only be done at a service station by an experienced battery man. Electrolyte consists of a solution of pure sulphuric acid and distilled water. If either

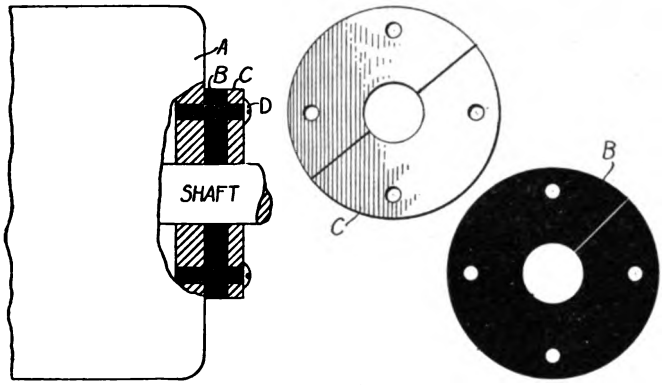
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of these fluids are not absolutely chemically pure, the battery will be destroyed within a very short time.

When the battery was tipped over, undoubtedly the rest of the cells were somewhat damaged. The sediment or mud at the bottom of the battery has probably worked up through the plates and will destroy them unless each plate is carefully cleaned. We are sorry that we cannot help you further, but this is one of the times when an expert's assistance is necessary.

2523 Oil Leakage in Generator Shaft.

From G. B. Gerhardt Bentson, Montana.—Can you tell me how to stop the leakage of oil between the fan belt



Showing How to Apply Felt Washer to Housing to Prevent Oil Leakage.

hole on the generator shaft and the generator housing on an Elgin car?

Reply: In practically any machine where there is a rotating shaft and sufficient room it is a very easy matter to apply a felt washer. The felt washer should be made as shown in the accompanying illustration at B and in order to slip it over the shaft it may be cut from the hole to the outside.

The hole should be made slightly smaller than the shaft. To hold this washer in place a second washer of brass or iron about ⅛ of an inch thick should be made. This washer should be cut into two pieces as shown at C and each piece bored for two retaining screws. Then the whole device applied to the generator or the housing either inside or out, as room permits, as shown in the same figure. A illustrates the housing, B the felt washer and C the iron washer which holds the felt in place.

2524 Muffler Explosions.

From H. H. Hiett, West Virginia—I have a new Ford car which frequently gives a report from the muffler like that of a shot gun. Recently the explosion burst the muffler open. Please tell me the cause of this and what will remedy the trouble?

Reply:—The explosion was probably caused by a short circuit in the timer or in the ignition system. Very occasionally one of the timer wires gets connected with the body of the timer and causes a back fire.

This is one possibility and if you are in doubt, we should advise you to carefully insulate all of the timer connections with tape.

The next possibility is that the exhaust valves in one of the cylinders became held open for a very short period of time, pumping the exhaust line full of unburnt gas and exploding it from one of the other active cylinders. We should advise you to clean out the exhaust line, remove the carbon from the cylinders, adjust the valve clearance in all of the valves to between 1/16 and 1/32 of an inch. Be sure that all the valves seat. Retard the spark and see that it occurs in the proper cylinder just after the piston has passed the top of its firing stroke.

See that the wires are connected so that the engine will fire in the order 1-2-4-3.

2525 Undercutting Mica.

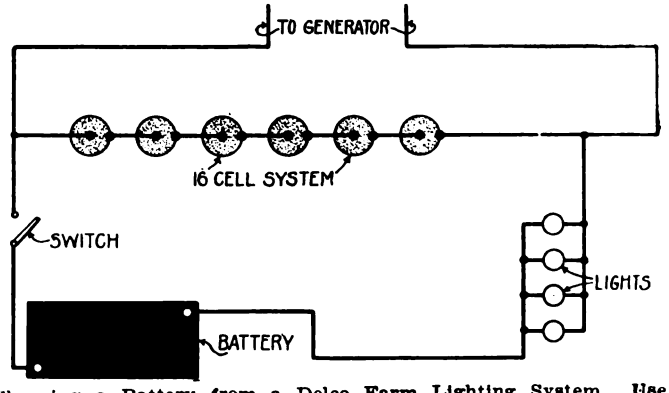
From F. P. Holtzman, Ohio.—My repairman, who is a good, conscientious mechanic, after turning off the commutators on the generator and starting motor of my car, wanted to dig out the mica from beneath the copper segments to a depth of about the width of the mica. I objected to this because I thought the particles of copper and carbon from the brushes would settle in these cracks and short circuit the unit. Should this undercutting be done or not?

Reply:—Your automobile mechanic was perfectly right in desiring to pick out the mica between the copper segments on the commutator, for by leaving this mica in position you are defeating your own argument. At present there is danger that the little particles of copper and carbon from the brushes will stay or become imbedded in the mica. If the mica is cut below the surface about the width of the segment, the little carbon particles will not be forced into its surface.

Then again, the copper segments will be worn much more smoothly if the mica surface is below them. There is also a tendency to arc when the mica is left flush with the surface.

2526 Charging Batteries From System.

From W. Siddon, Mississippi.—I have a 32 volt lighting plant (Delco System) and would like to charge a six volt storage battery from it. Will you kindly give me a



Charging a Battery from a Delco Farm Lighting System. Use Four 30 Watt Lights; or Three 40 Watt Lights; or Two 50 Watt Lights.

sketch as to how the wiring connections should be made?

Reply:—A wiring diagram is given herewith. For resistance you should use lights as shown; the number depends upon the charging rate.

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Dodge Car Clutch.

2527

From H. C. Gray, Maine.—Will you tell me what can be done with a Dodge Bros. car clutch which engages too quickly, or "grabs"?

Reply.—We are sorry that you did not tell us the year or model of your car, because there have been three different styles of clutches used on this machine. If the clutch is a cone arrangement, wash it thoroughly with kerosene oil and scrub it with a stiff scrubbing brush, then soak it well with Neatsfoot oil.

If your model is fitted with compensating plungers and springs around the edge of the clutch, tighten these springs slightly. Be sure to tighten them all about the same amount. If the clutch is not fitted with compensating plungers, get a number of small pieces of leather about an inch in width and ⅛ inch thickness and place them between the leather facing and the clutch cone. Space them about eight inches apart around the rim. If the clutch is of the multiple disc type, you will be obliged to replace the fabric facing on the clutch discs with new.

Finding Firing Order.

2528

From G. W. Lutz, Pennsylvania—I have a Saxon 1914 car and have just put in a new cylinder block. I have removed all of the gears and in replacing them I doubt if I did the work right as I cannot start it.

Will you give me the firing order of this machine? How can I time the magneto?

Reply:—We cannot tell you the firing order of such an old model, but we can tell you how you can find the firing order very easily for yourself. Open the petcocks or remove the plugs from the cylinders and press your hand down over the petcock or the spark plug hole. Then turn the engine over until you feel compression in cylinder number one. Remove your hand and turn the engine until that piston is at the top of its stroke. You will know now that this first cylinder is ready to fire because it has reached the top of its compression stroke.

Next put your hands over the petcock openings or spark plug openings in cylinders 2 and 3, and have someone turn the engine another half revolution. Compression will occur in either of these cylinders. If it is No. 2, the firing order of your engine is 1-2-4-3. If you find the compression is in No. 3 cylinder, then the firing order is 1-3-4-2.

You can verify this firing order by turning the engine over until the exhaust valve in No. 1 cylinder has started to open. Then watch the exhaust valves in Nos. 2 and 3 cylinders. If the exhaust valve in No. 2 cylinder opens next, you will note that this cylinder fires second in order and so the firing order is 1-2-4-3. If the exhaust valve in No. 3 cylinder opens second, you know that your firing order is 1-3-4-2.

After you have found the firing order, turn the engine again until the piston in No. 1 cylinder is at the top of its compression stroke. Turn it still further until the piston has just started to go down. Probably you will find the flywheel marked DC 1 and 4, and if so, turn the flywheel until the DC 1 and 4 is about ¼ of an inch past the indicator or the center of the cylinder block.

Retard the spark and set the breaker points so that they are just beginning to separate, or if this car was fitted with a vibrator system, set the timer so that the roller is just starting to make contact. Verify this setting by advancing the spark two or three notches. The breaker points should open or the vibrator should vibrate if it is a vibrating coil. Replace the spark plugs or close the priming cocks. Prime the engine with gasoline after being sure that all the plugs are absolutely clean. Crank the engine and it should start.

If after these directions you cannot start the engine let us know at what point the intake valve starts to open and the exhaust valve starts closing, and we will try to give you still further directions. The exhaust valve as a general rule starts to open 45 degrees before the piston gets to the bottom of its stroke and closes at top or slightly after top center. The intake valve should open about 5 degrees after the exhaust valve is closed.

One of the articles in our September number gives you a number of suggestions as to engine trouble and we should advise you to read it carefully.

Rattle at Back of Car.

2529

From W. Wightman, Maine.—I have a —— runabout and am having a peculiar trouble. On rough roads or over cobblestones there is a peculiar rattling noise in the rear. If the speed is even normal, one would think that the whole rear of the car was coming to pieces. Recently I put five bags of sand in the rear compartment and this seemed to quiet it. I need the room, however, and would like to take the sand out and stop the rattle.

When I try to go up a hill there is a bad knock in the engine and I have to pull the spark way down to stop it.

There is also a grind in the rear axle. Will you tell me how to repair the various parts of the machine?

Reply:—Very evidently your trouble of rattling at the back of the car is due to loose bolts or loose spring perches. The only thing we can advise you to do is to examine the springs very carefully. Be sure that they are tight upon the axles and firmly fastened to the frame. Be sure that the radius rods are tight and above all be sure that the body is firmly bolted to the frame. This last is a very common trouble, since body bolts work out of place very easily. The knock in your engine is due either to carbon deposits in the cylinders or a loose connecting rod, or a loose valve sleeve eccentric rod. This is a serious matter and you should take the car to an experienced garage man immediately. The grinding in the rear axle is probably due to wrongly adjusted gears. A garage man should be able to adjust these gears in a few minutes.

If you have very many troubles with your car our best advice is that you consult a repair man.

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The Chicago Permanent Exposition

The Community Garage Principle Enlarged and Carried Out In a Large Centralized Show Room

EVER since the Government issued the curtailment edict to the automobile manufacturers and other kindred interests, there has been a concerted drawing of deep breaths and a general feeling of "what can be done about it"; everyone has been looking for a solution or depending upon some one of the "larger lights" to furnish a solution to the problem.

At last, a body of far-sighted business men have produced a solution which upon the face of it is so simple that it seems almost ridiculous—a permanent exposition. Think this over, however, and you will admit that it is one of the most brilliant ideas of the century. An all-year-automobile-and-accessory-show.

In the beginning, automobile salesmen established their showrooms in different parts of cities. When the Speedbuilt agency opened a salesroom on a certain avenue, it was a signal that the next agency was to be established in the other side of the city. As time went on however, and agencies increased in number, they found it necessary to open salesrooms at times within a few miles of each other. Analysis showed that where three or more agencies were near together—more business was done, contrary to all ideas as to competition, and so salesrooms were shortly moved to a certain locality.

In every city throughout the country there is an "automobile row." The prospective buyer does not have to "walk his feet off" in order to see a certain line of cars. Within a few minutes he can visit many salesrooms and take his choice. This is the present situation, now let us take another step forward and look into the future.

You have in mind purchasing a machine, but don't know what it will be. You have received three or four pounds of automobile literature and have tired your eyes looking over advertisements in the papers, which say much about crank-shafts; multiple friction discs; demountable rims, and ventilated windshields. You finally decide that the question must be settled in your mind and that you will order your car today.

So, you step into a trolley and journey down-town to a large ten-story building, well lighted and attractive. You enter the door and are given a directory of the exhibits, prices, etc., and within five minutes you have looked over the five or six cars you are willing to consider. Then back you go to the first car and listen to the salesman and his arguments; two or three steps takes you to your second choice and you compare the two, and so on until you have obtained a full knowledge of all the cars.

How easy it is to make comparisons, you can almost put the cars side by side. The Speedbuilt has a patented no-man top; after a second's comparison, you find that the salesman for the Simplus neglected to mention that feature on his car. Point by point you compare the two until finally you can make your decision. You didn't have to walk two miles and you are absolutely sure that you own the car you really want, because you have chosen it by comparison.

"An ideal plan, but not possible," you say. Ah, that's just where you are wrong; it is possible and the Chicago Permanent Exposition is proof of its practicability, or will be within a few months. It is to be at once the biggest and most patriotic plan that the automobile world has seen, just as we have outlined the idea.

This Exposition is to occupy the immense Siegel-Cooper building at the corner of Van Buren and Congress streets, Chicago, Illinois. A nine story edifice, 400 feet long, 146 feet wide, with no partitions on any floor and containing 593,712 square feet, or nearly fourteen acres. It is accessible on all sides by elevated and surface lines and from this corner cars diverge to every part of the city. It is within two blocks of the postoffice, three blocks of the Board of Trade and only a short distance from all of the railways stations and principal hotels.

According to the latest plans the various floors are reserved for the following purposes:

First—Accommodations for a new car show.
Second—Accommodations for a used car show.
Third—Accommodations for a truck show.
Fourth—Accommodations for a tractor show.
Fifth—Automobile and Tractor Accessories show.
Sixth—Permanent display of Trucks and Tractors.
Seventh—Permanent display of Automobiles and equipments, etc.
Eighth—Permanent display of Used Cars.
Ninth—Four quarterly used car and truck sales.
Tenth—National exhibits of machinery, food, agricultural implements, public health exhibits, and anything of general interest to the public.

In other words, this great building is to be the center of interest for all matters pertaining to the public good. It will attract the attention of every visitor to Chicago and will be an ideal show room for the manufacturer.

For the year 1919 many features are planned, events which will attract men from all walks of life to the building where they will be able to see the cars upon exhibition.

As a practical proposition it would seem that nothing could be better. The cost of rental for a whole year of space is said to be little more than for the one week show at the Coliseum. The various show rooms throughout the city can easily be dispensed with and the machines exhibited in the one building, where the cost will be considerably lower.

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Chicago's Big Show Was a Success

The Various Exhibitors Were More Than Pleased At the Showing Made On the Municipal Pier At Chicago

AFTER the second annual National Exposition of trucks, tractors and accessories which was held upon the Municipal Pier at Chicago had drawn to a close and all things were taken into consideration, the unanimous opinion was expressed that the show had proved a great success.

War time economy and economy equipment are words that have been upon everyone's lips for the past year. We have conserved gasoline and repaired our old cars, and we have always been on the lookout for equipment and accessories which would enable us to conserve even more than formerly.

Our business has been to fight the hun both at home and abroad and like every other task we have undertaken, we have tried our utmost to accomplish what we started to do.

It was exactly this sentiment that permeated the annual exposition and throughout the spirit of patriotism predominated. The show proved conclusively that the Municipal Pier is the logical place in the future for holding exhibitions. It is 1,000 feet in length and presents many thousands of feet of clear floor space with no additions or second floors to tire the visitor.

The exhibit for trucks attracted considerable attention as did that for the tractor. Many farmers and small business men went away from the show with the fixed idea of purchasing one or both of these machines and many left their orders with the exhibitors. We feel that it is safe to say the visitors were 100 per cent. interested. It is true that there was not a great crowd of curiosity seekers, but the exhibitors all knew that the persons who did show interest enough to attend were prospective customers and such being the case they were able to devote their full attention to those showing an interest in trade products. Despite the latter conditions and other circumstances the attendance was far beyond that anticipated by the management, who did everything in their power to make the show a success.

As an added inducement and attraction, a portion of the pier was devoted to dancing each evening, and the music was exceptionally fine. The decorations were attractive and consisted mostly of flags and bunting. Since the pier seems to be an ideal place for such an exhibition, doubtless the management will endeavor to hold the show upon it next year.

Interesting Fuel Economy Tests

The Tests of Auxiliary Fuels, Carburetors and Attachments Made Under the Direction of the New York Herald Were Satisfactory

THE question of fuel economy, carburetor equipment, auxiliary fuels and special devices for winter equipment, is one which is puzzling every automobile owner at the present time, and we doubt if ever there has been a more laudable effort made than that of the New York Herald in planning the motor fuel economy test which was run on Thursday and Friday, October 3d and 4th, and to Washington the week of September 7th.

This fuel economy test, as the title indicates, was primarily to find to what extent certain advertised products would fulfill that which was claimed for them, and in every case the device entered showed a great efficiency and proved that no autoist can afford to run his car without investigating them.

Every means was taken to prevent criticism. There are at present on the market many hundreds of devices and the autoist has little chance of trying fuel devices unless he cares to invest his money. It is claimed that every manufacturer of such devices was given the opportunity to enter his product in the test. Many manufacturers did not take advantage of this offer and others were unable to enter their cars in time.

Only 29 entries were made, all by well advertised concerns whose products are well known to our readers. These appliances will be considered in their order and the complete results shown, discussed. It is not the intention of this article to boom or criticize any of them, simply to keep our readers informed as to the showing made.

There were three series of tests made, each upon one gallon of Socony gasoline in an auxiliary tank. The cars were operated at the speeds of 10, 20 and 30 miles per hour; the first day upon standard equipment, the second day upon the special equipment which they manufactured, or used the auxiliary fuel which they produced. The second series of tests were also made at corresponding speeds of 10, 20 and 30 miles per hour.

The Reed Appliance of Detroit, Michigan, demonstrated a kerosene dry gas carburetor together with a water attachment. At a speed of 10 miles per hour, the device showed considerably over 26 miles per gallon:

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at 20 miles per hour, 29 miles per gallon; and at 30 miles, 25 miles per gallon. With regular equipment the same machine, which was a Ford, developed 14, 16 and 13 miles per gallon, respectively.

The Hot Pin Manifold, manufactured by the Kerosene Burning Carburetor Co. of Detroit, showed 38, 35 and 29 miles per gallon at 10, 20 and 30 miles per hour respectively; while without this equipment the Ford car made 32, 23 and 17 miles at the same corresponding speeds. This same type of manifold was entered upon a second Ford and the results were practically the same.

The gasoline carburetor manufactured by the E. & E. Carburetor Company gave a mileage of 28, 31 and 27, as compared with 19, 18 and 16 miles at speeds of 10, 20 and 30 miles per hour with regular equipment.

The Toquet Manufacturing Company applied their carburetor and showed a mileage of 21, 24 and 17 at the three speeds mentioned, as against 16, 16 and 14 miles per gallon without the equipment.

The Miller Chemical Company, in using their product of Oxigene, showed a 50 per cent. saving in mileage as compared with the stock gasoline. The Crow-Elkhart car which was used gave mileages of 10, 12 and 10 as compared with 15, 18 and 15 after the gasoline had been treated with Oxigene.

The Duntley Company equipped their Ford car with their special gasoline generator with satisfactory results, showing mileages of 31, 20 and 23, as against 20, 24 and 27 without their equipment.

Butler Mfg. Co. made tests with a Ford and an Overland car. With the standard equipment the Ford car gave mileages of 24, 22 and 17 and with the special equipment 33, 28 and 22. When the Overland car was used the saving was extremely large. Without the equipment 12, 16 and 13 miles per gallon only were obtained, whereas with the equipment 24, 20 and 14 miles per gallon were obtainable.

The Sunderman Gasoline Carburetor upon a Ford car showed more than 100 per cent. saving in gasoline. At the three speeds without the Sunderman carburetor the Ford car gave only 15, 12 and 12 miles on a gallon, whereas with the carburetor the mileage obtained was 30, 35 and 27. Although the results did not show such a tremendous increase in efficiency when used on the Oakland car, the tests proved that the carburetor would pay for itself in a very short time. In this case, with stock equipment, the Oakland car made 15, 26 and 23 miles per gallon, whereas with the Sunderman carburetor 26 miles per gallon were obtainable at all three trial speeds.

The J. E. S. Gasifier entered by the Kerosene Motor Appliance also showed remarkable results. The first day's test with standard equipment showed 15, 21 and 15 miles per gallon as a good average. At the second day's test with the gasifier at the speeds of 10 and 20 miles per hour 31 miles per gallon were obtained, and at the speed of 30 miles per hour 27 miles per gallon. This test was made on a Buick car. The same device when used on a Ford car gave 27, 30 and 25 miles per gallon as against 22, 17 and 15 without it.

The Dippe Super Heater Co. demonstrated upon a Packard 1912 car, which with stock equipment gave 10, 12 and 10 miles per gallon. With the Super Heater the mileage was increased to 14, 15 and 14.

The E. A. Cassidy Company demonstrated Eccolene in a Franklin and Hudson car. In the first case the Franklin car with standard equipment ran 23, 24 and 20 miles on a gallon. After Eccolene had been put in the gasoline, 29, 27 and 20 miles per gallon were obtained. The mileages shown by the Hudson car with stock equipment were 16, 17 and 15 miles per gallon; however, with Eccolene in the gasoline, at the first two speeds 19 miles per gallon were obtainable, and at 30 miles per hour 16 miles per gallon were obtained.

The Remington Mfg. Co. used a Ford car which averaged 26, 18 and 14 miles without their equipment and showed 29, 34 and 22 miles per gallon with their auxiliary air carburetor.

The Rite-O-Way Mfg. Company's Maxwell car in the first test consumed a gallon of gasoline in 24, 26 and 24 miles at the three speeds, while with the auxiliary fuel attachment the same car gave 29, 27 and 26 miles per gallon. The Derf Mfg. Co. demonstrated two products, their Derf Spark Plug and a Kerosene Carburetor designed for 50 per cent. kerosene and 50 per cent. gasoline. With standard equipment the Mercer car ran 12, 13 and 11 miles on a gallon. After applying their spark plug and carburetor the car showed 15, 19 and 10 miles per gallon.

The Henner Automatic Oil Carburetor Company demonstrated their kerosene carburetor and water attachment on both a Ford and an Oldsmobile car. The former with the standard equipment gave 19, 26 and 22 miles per gallon, whereas with the attachment the mileage showed 18, 37 and 28 miles per gallon, a slight drop at the lower speed but a gain at the 20-mile rate. The results from the Oldsmobile were considerably more satisfactory. This car gave mileages of 11, 11 and 13 without the equipment and showed 16, 18 and 15 with the carburetor.

The carburetor used by A. H. Gussman showed a saving of nearly 50 per cent. on the Buick car, the mileages obtained with this carburetor were 20, 17 and 19, whereas without it the Buick developed 11, 12 and 9 miles per gallon.

E. G. Hodges in the twenty-sixth entry used a Kissel car, which developed 10, 11 and 13 miles on a gallon. With this equipment the same machine showed 14, 17 and 16 miles on a gallon.

A special attachment for feeding air at higher speeds was demonstrated by the National Mfg. Corp. and showed 14, 13 and 10 miles per gallon. Without this attachment the Winton car developed 11, 7 and 8 miles.

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Why Freeze to Death In Your Car?

Don't Be Like the Men Who Died of Thirst on Lake Superior Because They Thought the Water Was Salt.

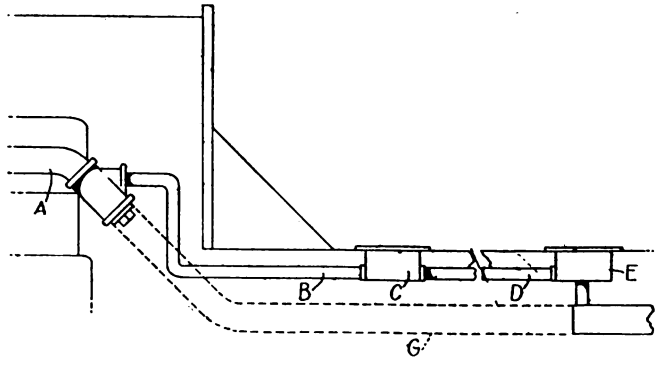
BY F. L. PHILLIPS

EVERYONE has heard the fable of the hen who starved to death when she was put in a peck measure near a barrel of corn, and doubtless everyone has thought to themselves, "what a foolish hen." Still I think I can show many of the car owners that they are in a measure almost as silly as the hen.

I have seen automobiles operated during the winter time in the various cities with the occupants almost frozen to death, sitting in the seats trying to keep their feet warm, and piling robes over their knees; but failing to accomplish their object. These same people are the hens, and the barrel of corn is the engine.

Let me explain my reason for this bold comparison. The automobile engine is essentially a heat engine. Its operation depends upon the expansion of gases by heating, and with every explosion a tremendous amount of heat is generated. This heat ordinarily is carried through the exhaust to the manifold, where it is cooled by contact with the surrounding air. This much heat is wasted.

Of course we want to waste the heat in the summer



An Easily Constructed Two Heater Combination for the Automobile.

time, but if the car is operated during winter months it is foolish to send the heat through to the manifold. Why not run it up to a stove in the tonneau? And it is easy enough to do this.

In the figure is illustrated a combination of two stoves which may be used for a touring car, one in front beneath the driver's feet, the other beneath the feet of the occupants in the tonneau. It can be made by practically any tinsmith and fitted to the exhaust line by any car owner.

With the exception of the stoves themselves, the system is made of pipe fittings. The stoves shown at C and E are nothing more or less than sheet iron boxes measuring twelve inches in length, six inches in width and two inches in depth. These boxes are fitted with covers and the openings with floor plates threaded for a 1½-inch iron pipe.

At the end, the exhaust manifold is fitted a 45-degree elbow. One end of this elbow is plugged, while the 45-degree connection is connected through the pipe B to the hot-air stove beneath the driver's feet, shown at C. Through the pipe D the front stove is connected with the one in the tonneau, E, and this is connected through a length of pipe and elbows to the manifold. The old exhaust pipe, as shown by the dotted lines at G, can be removed until spring and then be installed.

The holes in the floor left after the removal of the two stoves can be covered by a flat piece of sheet iron. The covers to the two stoves should be fitted to the body of the stove and held by bolts so that they can be removed frequently for cleaning. All the hot gas from the engine must pass through the two stoves, consequently the stoves are warmed at all times.

If the car owner desires to control the heat in these stoves, the old exhaust pipe can be left in place and a butterfly valve fitted to the line B, as well as a butterfly valve to the line G. In this way any or all of the exhaust gas can be diverted to or cut off from the two stoves.

Upon the market at the present time are many such stoves. Our suggestion is only for those who like to work upon their own car or who do not have the money to purchase the manufacturer's article.

If you like this magazine and feel that it is useful and interesting, the *one best way* to show your appreciation, is to purchase your accessories and supplies so far as possible from our advertisers. Also write to our advertisers for catalogs, printed matter and prices, not forgetting to always mention the fact that you saw the advertisement in the Automobile Dealer and Repairer.

SOMETHING FOR FATHER

PERHAPS it is a bit too early for us to wish our readers a Merry Christmas, so we will defer this greeting until our next issue, which is to be the Christmas Number, and it is about this Christmas Number that we want to write.

Doubtless everyone of you is cudgeling his or her brains in a vain endeavor to think of some proper present for father or the rest of the family. We pride ourselves that we have solved the problem and we are so enthusiastic about it that we want you all to know what our solution is. Like every good idea, however, you can only

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find it out by taking the magazine. In it we will tell you of proper gifts for the whole family.

Our advertisers have been asked to co-operate and we trust that after you have read the November Automobile Dealer and Repairer you will be able to purchase suitable gifts for Christmas, gifts that will be both pleasant and practical.

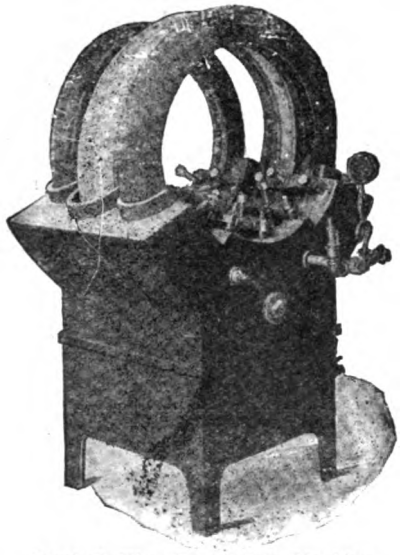
You know that we are doing all we can, every one of us, to win the war. We cannot afford to waste money. We cannot afford to spend our money foolishly, and so we want to purchase presents that are useful as well as ornamental.

You would not think of sending a costly photograph to the starving Belgians, or a piece of fancy millinery to the suffering Poles. You would try to send them warm clothing or something to eat. You can take our word for it that father will be more pleased with something for his automobile than he will with a pair of gaudy socks or a flashy necktie, and so we advise you to read our Christmas Number.

NEW AND INTERESTING THINGS IN MOTORDOM

Zwebell Tire Rebuilding Machine.

Never in the history of the tire business has the demand for rebuilt tires been as great as it is today. Urgent requests are made to the tire users to conserve their tires and eliminate the waste that in the past has run into enormous figures.



Zwebell Tire Rebuilding Machine.

It is a known fact that a large percentage of carcasses outwear the original tread and if retreaded are good for many miles of service. Owing to government regulation, eliminating a large number of the tire sizes now in use, will create a further demand for rebuilt tires that cannot be obtained from the manufacturer. With this demand is opened a large market for tire rebuilding and the up-to-date repairman or garageman will anticipate it by installing tire rebuilding machines.

The Zwebell Retreader and Tire Rebuilding Machine, as the cut shows, is a block type casting, capable of accommodating three large tires. The one-third circle cavities, with a cross section of 3½, 4¼ and 5¼ inches, respectively, will take care of any size tire from 28x3 to 38x5½ inches. The cavities are deep enough to cure the tire over the beads when desired. The boiler is self-contained and uses either gas or kerosene as fuel to generate steam.

The ends of the cavities are provided with semi-curing flanges, to guard against any breaks in the cure. The raised centers of the side of the cavities are so constructed that with the use of air bags and standard bead molds, a section can be cured in the same manner as in regular sectional molds in rib, or with a pad in either plain or non-skid design. Full particulars and description of this machine can be obtained by writing the manufacturers, Zwebell Brothers Co., Milwaukee, Wis.

A War Essential.

The Priorities Division of the War Industries Board, in Circular No. 19, dated September 3, 1918, has placed manufacturers of ball bearings and steel balls on the Preference List, with a rating of "Class B-3," conditioned upon their executing and filing pledges of co-operation with and observance of the rules of the Priorities Division.

Graphite as a Lubricant.

A microscope shows all metal surfaces to be irregular. The surfaces look like a nutmeg grater. Flake Graphite attached itself to the high spots, filling in depressions and forming over the whole surface a thin, tough film, unctuous to the highest degree, thereby preventing metal-to-metal contact and substituting the low frictional contact of graphite-to-graphite for the high frictional contact of metal-to-metal.

Dixon's Flake Graphite is said to be:

1—Unaffected by high temperatures.
2—Cannot be carbonized or ignited.
3—Cannot possibly give off explosive vapors.
4—Will not accumulate dust or grit.
5—Does not clog discharge valves.
6—Improves frictional surfaces.
7—Prevents metallic contact.
8—Reduces amount of oil or grease.
9—Reduces friction.
10—Prevents shut-downs.
11—Saves power and fuel.

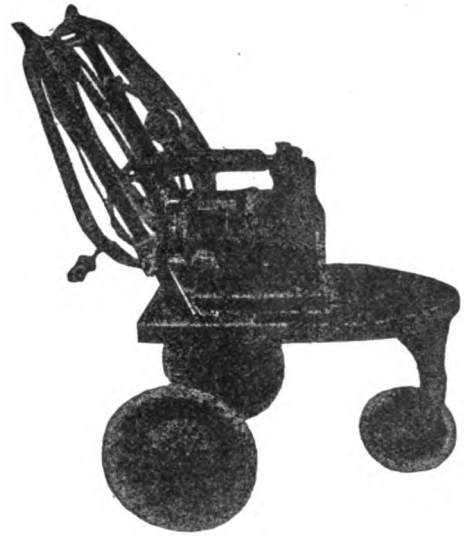
Graphite as a lubricant is not a competitor of greases or oils. On the contrary, the two in most cases go hand-in-hand. Dixon's Flake Graphite is said to improve all oils and greases, the oils acting as a carrier to properly distribute the graphite. There are some cases where we do not recommend graphite as a lubricant, particularly if the lubricant must be a non-conductor of electricity, as graphite is a good conductor. And vice versa, there are some conditions when graphite alone works best.

The proper use of Dixon's Flake Graphite will reduce the cost of cylinder lubrication at least 50%. This is no exaggeration either.

A mixture of Graphite permanently suspended in oil has no particular advantage over a non-graphited oil as a lubricating material because the particles of graphite, being in a perfect suspension, cannot break through the surrounding film of oil or easily become attached to the metal surfaces. They simply move about in the oil film without at all decreasing the viscosity of the oil itself, the only way in which any reduction of friction could be brought about. In fact, a mixture of finely divided graphite and oil has a higher viscosity than that of oil alone, and so reduction of friction is not to be sought along this line.

Lectroflater Carriage Outfit.

The Black & Decker Mfg. Co. of South Calvert St., Baltimore, Md., have just added to their line a No. 2 carriage outfit which should be of interest to automobilists and garagemen. This machine consists of the well-known No. 2 Lectroflater, mounted on a seamless steel tubing reinforced carriage, trimmed in nickel and driven by electrical current.



The New Lectroflater.

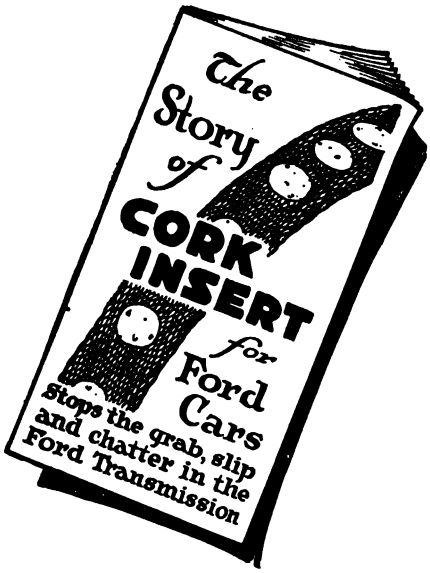
The carriage is fitted with three steel wheels, rubber tired, to be used on hardwood floors, and is exceptionally strong and convenient. With the machine is furnished 15 feet of flexible cord and 20 feet of air hose.

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Ford Owner's Booklet.

A new booklet, just off the press, goes thoroughly into the question of transmission action of Fords. It tells how a smoother working Ford can be had, simply by taking proper thought in the purchase of transmission lining. The causes of the chattering and vibration which attends the transmission action in the Ford are analyzed, and the method of overcoming them clearly shown.

One of the features of the booklet, which is named "The Story of Cork Insert," is



views of the factory where Cork Insert Transmission Lining is prepared. The big machines are shown which punch 24,000 sets of linings in an 8 hour working day. Also the rooms of girls who are in the act of setting the corks into the linings, are shown. One girl can set 10,000 corks in a day.

Another department of interest is the pages which give the experiences of Ford owners in the use of Cork Insert. After reading of the long mileage secured and the smoothness and quietness of operation, it is not difficult to understand why Cork Insert Transmission Lining has come into more extensive use during its first year on the market than any other automobile accessory ever offered the public.

A copy of the booklet, "The Story of Cork Insert," will be mailed gladly to any reader of this journal, who will address request to Advance Automobile Accessories Corp., Dept. J5-1, 56 E. Randolph St., Chicago.

Handy Auto Brush.

Auto owners in general, and particularly owners of commercial garages and auto fleets will be interested in the Water Spray Auto Brush now being marketed by the Scully Jones Company of Chicago. A brush of the best grade of bristles, circular in shape, has a hose connection in the center through which water is sprayed.

The part patented consists of an aluminum valve forming the handle of the brush and controlling the flow of water as the brush is used. An opening in the bristles enables the user to direct a spray of water at a distance and increase the volume as desired.

To use like a sponge the spray is reduced to the amount necessary, the water coming through the bristles keeps them free of dirt, washing it off the car without scratching.

An extension handle adapts the brush to work on auto tops and places inaccessible by hand.

Large fleet owners, including the Armour organization, have tested the brush thoroughly and are using it in place of sponges, as it does the work better and quicker at a big saving in initial expense, in labor and time.

The Scully Jones Company is planning an extensive advertising and distribution campaign.

Steven's Catalog.

Stevens & Company of 375 Broadway, New York City, have just issued a new catalog of their line of products which should be in the hands of every automobile accessory buyer. Stevens Products are well known throughout the industry and consists of a wide range of automobile accessories. Write for the catalog; it's free.

The Modern Motor Car.

A book which the trade has been looking for for some time is now being published by Laird & Lee, Inc., Publishers, Dept. A D R., Chicago, Ill. and entitl d "The Modern Motor Car." It contains 536 pages and is illustrated with 225 cuts.

It has been written from a practical standpoint and takes up in detail the construction and repair of every automobile part. Electrical systems, "that mysterious part of the car," are gone into in great detail. The storage battery is fully described and hints for its upkeep and repair given.

As a book of condensed information and practical mechanical textbook it stands with the best. It is concise and to the point and we can safely recommend it to our readers.

Automatic Extension Reel.

It is safe to say that at least one hour a day is wasted in hunting for or repairing the drop lights in a garage. There is also a great fire hazard when insulation is worn from the wires by contact with sharp objects and immersion in oil and grease upon the garage floor.

All trouble and danger is eliminated by the installation of the Automatic Extension Reel, manufactured by the Cincinnati Specialty Mfg. Co., Sylvan Ave. and Powers St., Cincinnati, Ohio. This device can be attached to the wall or celing of the garage and consists of a reel and a length of flexible lamp cord to which is attached the portable light.

The light can be drawn to any distance within range of the cord and upon release the cord winds back upon the reel. The cord cannot drag in the oil or water upon the floor or get in the way of other machines, and the light is always where it is wanted. The device is strongly made and should be in every garage.



Automatic Extension Reel.

A Novelty Gasoline Tank.

A gasoline tank with no liquid in it is a sentence descriptive of a new invention worked out by two elderly Brooklyn men. This invention should prove very adaptable to airplane service for many reasons.

It is a tank made of aluminum, in which are placed enough Balsa wood blocks to fill it. This wood is lighter than cork and very porous. The four sides of each block are grooved to provide for air circulation. With the tank assembled, gasoline is poured into it and the wood blocks absorb a large amount. The top of the tank is fitted with two pipes, one for air inlet, the other for connection with the engine.

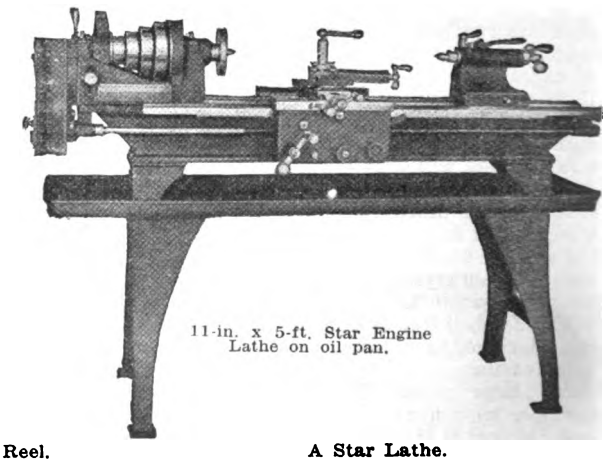
In operation, air is drawn through the tank past the blocks which give off the stored gasoline, mixed with air, to the engine, thus doing away with the carburetor.

The inventors claim that even if the tank is punctured with holes, it still functions properly until all the gasoline is exhausted. Should a bullet puncture such a tank, were it fitted to an airplane, the gasoline could not pour out and ignite as at present. Such an invention presents many interesting features.

Star Lathes.

In this number is printed the third instalment of the Metal Turning Lathe, an article which shows how necessary and practical this machine can be made for a garage, or even for the car owner. We call the attention of our readers to the Star Lathe made by the Seneca Falls Mfg. Co., Inc., 383 Fall St., Seneca Falls, N. Y.

This machine sells at an exceptionally low price and is a fine machine. The 11-inch-by-5-foot machine should be suitable for any garage where quality work is desired. Upon this small machine can be done many jobs and the repairman will soon find that it will pay for itself in a short time. Readers interested in garage equipment should write the manufacturers for a copy of their free catalog.



A Star Lathe.

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A message

of immediate importance to every car and supply dealer—

High priced Gasoline,

and the necessity for making every available car do its best, mean a heavier than usual demand for Rayfield Carburetors because of their known economy.

Against that demand

we have but a limited stock of material, may get little if any more, and war orders are fast absorbing our capacity.

Moral: Put Rayfields in

stock now—yes, write the order now, or you may be too late.

Service stations and dealers everywhere.

Findeisen & Kropf Mfg. Co
21st and Rockwell Sts., Chicago

RAYFIELD CARBURETOR

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Jefferson Coils.

The Automobile Ignition Coil situation has, in the past, been a serious problem for jobbers, dealers, and service stations, owing to the multiplicity of types on the market. Many jobbers and dealers have had to pass up the coil field almost entirely because of the large and varied stock



A Jefferson Coil.

of Coils that would be necessary to take care of all requirements.

The Jefferson Electric Manufacturing Company of Chicago have recently placed on the market a line of Battery Replacement Coils and Fittings which are sufficiently flexible to displace any type of Coil on battery equipped cars. The extreme flexibility of Jefferson Coils is obtained from several features, which include the Fittings, Adjustable Caps, Terminals and Mounting Arrangements.

With a small stock of Jefferson Coils, any service station, garage, or repair shop will be prepared for any emergency. Heretofore it has been necessary to lay up a car for perhaps several days while a new Coil was being obtained. Now, however, any car can be placed in service within a few minutes. It is only necessary to remove the old Coil and connect the Jefferson.

Starting conditions require a Coil that will produce a hot, intense spark when the battery is at the lowest ebb. Jefferson Coils are guaranteed to take care of this extreme condition.

To aid jobbers, dealers, service stations, and garage men, the Jefferson Electric Manufacturing Company have compiled a folder containing complete and authentic data covering all standard Battery Ignition Systems. This folder lists all makes of cars from 1912 to the present date, and gives the year, model, type of ignition, and style of Jefferson Coil to be used for replacement. This folder will be sent free of charge to any dealer, garage, service station, or jobber. Request should be addressed to the Jefferson Electric Manufacturing Company, Congress and Green Streets, Chicago.

Steer Warms.

Cold hands are not conducive to comfort nor safety in driving an automobile and the driver cannot always afford to swathe his hands with thick heavy gloves which hamper his movements.

The Interstate Electric Company, Dept. 108, New Orleans, La., have solved the problem and offer an attractive device called "Steer Warms." This accessory consists of two neat leather-covered grips, studded with metal plugs and protected by brass plates, which clamp and lace upon the steering wheel.

Through a switch and wires, these units connect with the storage battery, or in the case of the Ford car with the magneto, and with the switch on, the current heats the units to the proper temperature. But little current is required and it is claimed that there is no danger of overheating. These little comforts make a fine present for Christmas, their cost is little, their utility great.

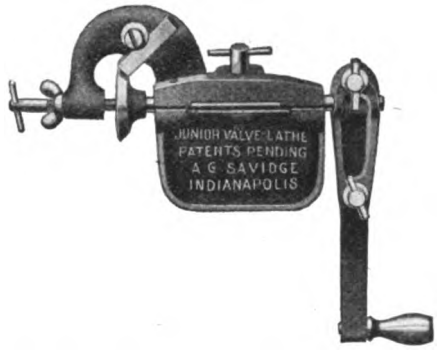
Greater Facilities.

The France Manufacturing Company of Cleveland, Ohio, makers of F-F Battery Boosters for charging storage batteries from both alternating and direct current, has just moved into its new factory building on Berea Road, oposite The Winton Motor Car Company's plant.

With its greatly increased facilities the company is now in a position to make prompt shipment of its products to all parts of the Allied World. Inquiries concerning F-F Products will be appreciated.

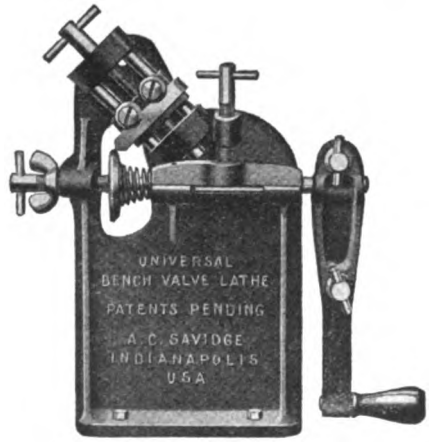
Savidge Valve Lathes.

As every repairman knows, once a valve has been ground out of shape it cannot be restored satisfactorily by grinding. This operation will only spoil the valve and damage the seat until the block is nearly worthless. Usually a valve in this condition is thrown away and a new one ground into place; a needless waste of material.



Savidge Junior Valve Lathe for Small Engine Valves.

The A. C. Savidge Co. of Indianapolis, Ind., have perfected two valve lathes for recutting or refacing valves which are of great interest. The first is designed for large valves while the second, known as the Savidge Junior, is intended for cutting smaller valves. As the illustrations show,



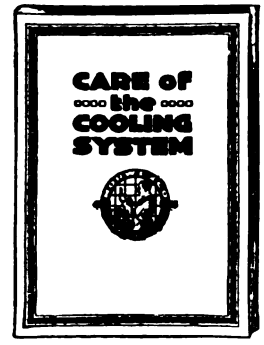
The Savidge Universal Bench Valve Lathe Set.

both machines are operated by hand, the handle is mounted on the valve stem and the cutting tool adjustment turned with the fingers until the whole face of the valve has been restored.

The action of the machines is clearly shown in the accompanying illustrations.

Care of the Cooling System.

The average motorist spends little time in trying to maintain the running efficiency of his car. This is especially true in caring for the cooling system, which is more important than the average motorist thinks, yet it is generally neglected. If the cooling system is not kept clean and free from



The New Norwesco Booklet.

leaks it impedes the efficiency of the engine and increases its cost of operation.

The Northwestern Chemical Company, of Marietta, Ohio, makers of the NORWESCO line of "Chemically Correct" Automotive Equipment, have issued a 20-page booklet entitled "Care of the Cooling System."

This booklet conforms to its title, giving the motorist many practical suggestions and valuable information which will assist him in giving proper care to the cooling system. A copy of this booklet can be secured, postpaid, by writing The Northwestern Chemical Co., 1309 State St., Marietta, Ohio.

Goblin Soap.

"I can always tell whether a man uses Goblin Soap by looking at his hands," says a dealer in automobile accessories. Every reader who owns an automobile or does repair work knows how hard it is to remove that line of crepe from around the finger nails and how difficult it is to wash out the grease from the pores of the skin.

Goblin Soap, manufactured by Cudahy, 111 West Monroe St., Chicago, Ill., is claimed to dissolve greasy dirt and remove it from the pores without injuring the skin. The manufacturers say that it will dissolve in any water, hard or soft, warm or cold, and that it answers the soap problem.

Economy and Oxigene.

The New York *Herald*, supported by the Automobile Club of America, has just conducted a series of tests on various devices for the conservation of gasoline. These tests were held on October 2nd, 3rd and 4th at the Motor Speedway, Sheepshead Bay, Brooklyn, New York.

The technical committee consisted of three men well known in automobile circles. Mr. Richard Kennerdell, chairman, is a member of the contest board of the Automobile Club of America. Mr. W. H. Stewart, president of the Stewart Automobile School, and Mr. H. S. Tarantous, technical engineer of *Motor Magazine*. Mr. Hugo C. Gibson and Mr. George W. Henham, both members of the Society of Automotive Engineers acted as engineering experts for the affair.

Twenty-nine cars were entered. There were 19 devices tested. Of these some were carburetors, both for gasoline and kerosene, some were special spark-plugs

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Give Him Something for His Car—Of Course

Aren't you proud of your new shiny automobile?

Isn't it just the best thing you have ever owned?

Doesn't it belong to the whole family?

Of course it does!

Wouldn't it look nice if it had a pretty, new spot-light on the windshield?

Wouldn't you be nice and comfy riding in it this winter, if it was equipped with a stove for keeping your feet warm?

Why can't you give each other practical presents for Christmas, gifts that can be used on the family car?

Don't miss the November Christmas number of the Automobile Dealer and Repairer—it will help you solve the Christmas present problem.

It will tell you what to give father, mother, brother, sister and the kiddies.

There will be lots of special advertising by my special friends in it too—and so you can help me out by picking just what you want for Christmas.

Yours for a happy, joyful and economical Christmas.

SANTA.

Forms Close November 6th, 1918 **Get Your Copy In Early.**

MOTOR VEHICLE PUBLISHING CO.

71-73 Murray Street **New York City**

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and some were special kerosene devices. Of the large number of auxiliary fuel gasoline savers which are now on the market, and the total of which is probably well over 100, only three were entered in the test, although practically every one received an invitation to join in this great opportunity to prove the value of their products. Oxigene was one of the three and that it came out with flying colors can be seen by referring to the tests printed elsewhere in this magazine. The tests show that at a speed of ten miles an hour the saving due to Oxigene was 55 per cent. At twenty miles an hour, 47 per cent. At thirty miles an hour, 50 per cent. The average saving for the three speeds was a little over 50 per cent.

Although many extremely satisfactory private tests have been made, this is the first contest in which Oxigene has had an opportunity to make a sweeping public demonstration of its great practical value in saving gasoline. The fact that, in addition to this big saving in the actual fuel, it also prevents entirely the formation of carbon, makes Oxigene a wonderful boon to all users of motor cars or trucks. This fact will become more and more evident as the motoring public becomes familiar with it. Oxigene is manufactured by the Miller Chemicals, Inc., and sold by Stewart & Co., 349 West 26th St., New York, N. Y.

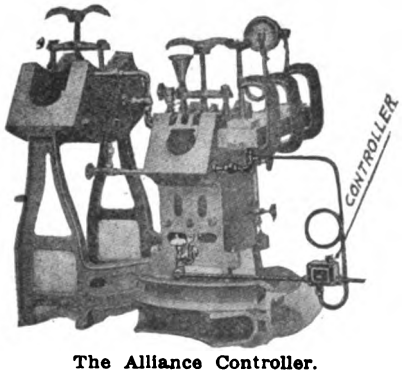
Ironclad Kraki Twills.

The Franklin Manufacturing Co., 132 Market Place, Baltimore, Md., announce that they are manufacturing a cloth that wears like leather and is known as Ironclad Khaki. From it may be made overalls, shirts, pants or any other clothing that is required for real service.

This announcement should be of interest to our garage and repairmen readers, all of whom are invited to write for samples of the cloth which is made in specials for both men and women.

The Alliance Controller.

Perfect control of the heat in a vulcanizer is necessary before the repairman can hope to secure satisfactory results when repairing tires. The older makes of vulcanizers were not fitted with automatic controlling devices, and the operator often



The Alliance Controller.

spends valuable time attending to the regulation.

With an Alliance Controller attached to a steam vulcanizer, the repairman need not worry about the steam pressure. He knows that the moulds will never get too hot, or the steam pressure rise too high. This device is manufactured by the Alliance Controlling Co., Main St., Alliance, Ohio, and can be attached to any steam vulcanizer.

It automatically controls the gas flame beneath the boiler. As the pressure rises, the gas is cut down in proportion until the correct steam pressure is obtained, thereafter the controller keeps the pressure constant. The pressure control can be altered within a certain range by a special key. It is very simple and guaranteed to give satisfaction. Once installed and set, it needs no further attention.

The manufacturers claim that with the installation a large saving of gas is had and that there is no worry about uncertain pressure nor explosion.

MEETS A VERY SEVERE TEST.

Vaporizer Comes Through With Flying Colors.

Mr. L. Lewis of 75 Grampian Way, Dorchester, Mass., has been using an Olsen Kerosene Vaporizer for some time on his Ford sedan around Boston. Recently he put it to a strenuous test, when he took a 120-mile round trip to New Hampshire. When queried about the performance of the Olsen on this trip, Mr. Lewis stated that he could not praise it too highly.

"On the trip," he said, "I got into some awful going and went through 12 miles of flood and very deep mud, on low gear. The car came out of it as sweet as when she went in.

The heat from the vaporizer gives such a hot, dry gas that you can run your engine slower than on gasoline. On gasoline the engine would miss and sputter, but with the Vaporizer it is as regular as clock work.

For a number of years we have had devices supposed to do what the Olsen actually does do, but none of them have done it. People are astonished to find that the Olsen does the work without soot or carbon, smoke or smell. The engine starts right off and in about a minute I turn her over on kerosene. I can climb hills better with the Olsen than when running on gasoline; the engine never stalls. Moreover, if you burn gasoline with the Olsen, you will get much better results than before, because the Olsen is better able to utilize the inferior gasoline we get to-day.

I have had absolutely no lubrication troubles. I looked for this at first, because I know it requires a great deal of attention, but the Olsen has a clean record. Inferior gasoline does lead to lubrication troubles, but the Olsen so thoroughly vaporizes the kerosene that lubrication troubles are impossible with it. Combustion is simply perfect and the kerosene is used up to the very last drop.

If people knew how good the Olsen really is, there would be a line of Fords a mile long waiting their turn to get one. Indeed, if it were only half as good as it is, I should still be an Olen booster."

Tire Economy Conference.

A very interesting four-day meeting of the Automobile Tire Economy Conference was held at the Congress Hotel, Chicago, late in September. This conference marked the first national organization of a firmly established industry, that of tire fillers.

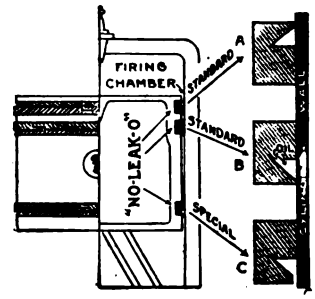
Prominent representatives of the War Department, American Red Cross, Y. M. C. A., Salvation Army and various Federal and State economy boards addressed the conference and all agreed that motor transport was of vital importance in winning the war. The practicability of tire fillers was discussed and it was agreed that if all truck and pneumatic tires were replaced with filler, that much time and money could be saved.

No-Leak-O Piston Ring.

In the September number of The Automobile Dealer and Repairer were described the No-Leak-O Piston Rings; through a typographical error a mis-statement was made. A correct description of the action follows:

When No-Leak-O piston rings are used dirt from the explosion, carbon and fuel are prevented from leaking into the oil base by the patented oil sealing channel. At the upward stroke, by capillary action, this dirt is carried into the firing chamber and ejected with the exhaust, rather than into the oil pit.

Since the September article appeared the



name of the manufacturers has been changed to that of No-Leak-O Piston Ring Co., the address remains as before, at 824 W. North Ave., Baltimore, Md.

Standard Motor-Pep.

Every reader realizes that present-day fuel is not what it was a few years ago, that it does not vaporize readily, that it dilutes the lubricant in the base of the engine and that it does not give high mileage.

The Utilities Co., 310 Citizens Building, Cleveland, Ohio, claim to have solved the problem and are introducing their product called "Standard Motor-Pep," a scientifically compounded composition in tablet form which is designed to be dissolved in the gasoline. If directions are followed, it is claimed that more mileage is obtainable, fuel bills are cut and that the engine will start easier and run smoother than ever before. In addition to these advantages, Motor-Pep is said to eliminate carbon.

Garagemen and dealers should investigate the special proposition given by this concern in their advertisement in this magazine. Car owners should write for a sample.

The Rex Oil Cup.

Automobile manufacturers and engineers have at last decided that oil is more preferable in certain cases than grease, especially upon springs, spring bolts, and other important parts. A number of machines are being put on the market which are fitted entirely with oil cups rather than grease cups.

Frank X. Devlin, 198 St. Clair Ave., Detroit, Mich., is putting a patented Rex, all enclosed oil cup on the market to replace the regular grease cup installation on the older cars. This cup is made in a number of models and sizes and designed to be applied to any position in place of grease cups.

The Rex cups may be obtained with threaded nipples or with a special nipple which can be driven into a drilled hole without threads. It is simple in construction and made of the best of material. The covers are dust and water tight and held closed by strong springs. Every automobile owner or repairman should familiarize himself with this line.

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GREASY dirt is the hardest to remove; ordinary soap doesn't touch it. If you'll try Goblin Soap the next time you get a bad case of dirty hands you'll have a pleasant surprise.

Goblin Soap is a splendid all around soap for toilet, bath, kitchen, garage, shop, — anywhere where there is dirt to be removed without injuring the skin. Try it.

It lathers quickly and easily in any water, hard or soft, warm or cold; it's gentle and thorough.

For Toilet or Bath
Large Cake
5c
Price in Canada 7c

If your dealer does not have Goblin Soap, please send us his name and we will see that you are promptly supplied

CUDAHY, 111 W. Monroe St., CHICAGO
64 Macauley Avenue, Toronto, Canada

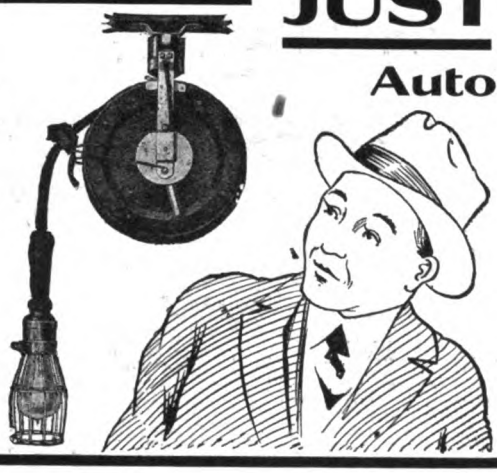


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JUST WHAT I WANT

Automatic Extension Reel

For Electric Lamps



Take your lamp with you to any part of your machine shop or garage—an automatic lock holds the lamp at any desired distance from the reel. It can't get out of order because it's professionally manufactured.

Tisn't a half-baked proposition nor an amateur outfit—but a splendidly strong Extension Reel for men who haven't got time to bother with any nonsensical makeshift. Equipped with 25 feet of reinforced cord. It's all good quality—don't cost much either. Approved by the Underwriters.

Write for Particulars

The Cincinnati Specialty Mfg Co., Inc.

Sylvan Ave. and Powers Street - CINCINNATI, OHIO

Neatsfoot Oil—Past and Present.

In former days when oil was wanted for softening harness or other leather articles, pure Neatsfoot was always recognized as the best for the purpose and was used freely.

With the advent of the motor car, the use of Neatsfoot Oil was found to be very beneficial in softening the leather facings on the clutches. Great quantities were used annually for this purpose and gradually the demand began to exceed the supply. Then, as prices advanced, substitution was resorted to. Manufacturers, careful of their reputation now announce upon the labels of the containers in readable type that the contents is a Neatsfoot Compound or Mixture. Other manufacturers use labels upon which the word "Neatsfoot" is displayed prominently in large type while the word "compound" or "mixture" requires a magnifying glass to find it. Still other manufacturers continue to put out a package labelled "Neatsfoot" or "Neatsfoot Oil" in which the percentage of real neatsfoot is so small that it is a joke to use the word Neatsfoot in connection with it at all.

Of course, manufacturers cannot be censured for putting out substitutes for an oil which through scarcity, has become so valuable. In justice to the public as well as themselves, however, they should label the containers truthfully. They also should be certain that it will do the work of pure Neatsfoot for which it is substituted and do it without any detrimental action.

So bad has the situation become, that many of these alleged Neatsfoot Compounds contain no Neatsfoot whatsoever, and are composed principally or wholly of mineral oil which is the cheapest oil available.

Mineral oil is not considered of the highest value in softening leather as, while it readily penetrates and makes it pliable, the effect is not permanent. Mineral oil does not remain in the leather but comes out again about as quickly as it goes in. Neatsfoot Oil on the contrary, penetrates and is absorbed by the leather remaining in the fibres and keeping it flexible.

The Frank Miller Co., of 349 West 26th Street, New York, is putting up a Neatsfoot Mixture which not only is distinctly labelled but which is composed of a fair proportion of real neatsfoot oil blended with other animal oils of recognized value in softening leather. There is some mineral oil in this mixture, but great care is taken to use only neutral oils which are entirely free from acid.

This mixture, which his put up by a firm long recognized as extremely particular with regard to the high quality of their products, is so compounded that it has many of the properties of pure Neatsfoot Oil. It softens leather, and is rapidly absorbed leaving a flat surface of good holding qualities as is required for a friction clutch.

Large Welding Shop.

Manufacturers who have government contracts to make tanks, cans, containers, ovens, etc., which require the joining of metal to metal, can secure unequaled service by arranging to have their work done in the new Welding Shop just opened by the Imperial Brass Manufacturing Co., Chicago.

This Welding Shop is one of the finest and most thoroughly equipped in the country and maintains a staff of expert welders who are in a position to help manufacturers to make prompt deliveries, keep up production and reduce manufacturing costs. The Oxy-Acetylene Welding process used in this shop is far superior to riveting in making metal joints.

Broken automobile parts and machinery of all kinds are also quickly repaired at the Welding Shop which is perhaps the largest in the Middle West. This department occupies a new building 50x 150 feet, erected especially with a view to speeding up government contract work, and is ready to give exceptional service. Those interested in securing such service should write to Imperial Brass Mfg. Co., 1200 West Harrison street, Chicago.

The Autoreelite.

A device which may be termed the "Motorist's Friend" and a three-in-one utility is being manufactured by the Anderson Electric Specialty Co. of 118 S. Clinton St., Chicago, Ill.

The Auto-Reelite is a combination spot and trouble light and is permanently connected with the storage battery and mounted upon the windshield. A turn of the knurled nut releases the light so that it can be carried to any part of the automobile. Inside the fitting is mounted a strong, spring reel upon which is wound 12 feet of cord which winds automatically when the light is returned to the socket.

The light may be obtained fitted with a rear-view mirror or plain, in a number of sizes. With the lamp is furnished three pairs of windshield clamps for round, oval or rectangular frames. The whole device is simple, ornate and handy and a practical fitting for any car.

Johnson's Freeze Proof.

The sharp fall mornings remind us that winter is fast approaching and the enterprising dealer will begin to lay in his store of winter accessories, for very shortly automobilists will begin to demand winter equipment.

Now is the time to open a campaign for the sale of radiator non-freezing solutions and one product that is attracting universal attention is manufactured by S. C. Johnson & Son, Racine, Wis., termed "Johnson's Freeze Proof."

This product, like all of Johnson's products, has been carefully tried out by actual experiment. It is claimed that Freeze Proof has no chemical effect upon metal or rubber, that it is non-acid and that if used according to directions there is absolutely no danger of a radiator freezing.

Freeze Proof is bound to be very popular this winter, for the very reason that an extensive advertising campaign is being carried on through popular magazines and widely circulated publications like the Saturday Evening Post, Cosmopolitan, and the American Magazine. The dealers are offered a very attractive proposition and the price is so low that it offers a ready sale to all motorists.

Rain-Sno Windshield Cloth.

The Suffolk Manufacturing Co., Inc., Dept. C, 69 Long Wharf, Boston, Mass., are marketing a product which is termed Rain-Sno Clear View Windshield Cloth. This cloth is chemically treated and once it has been rubbed over the surface of the windshield it is claimed that no snow or moisture will collect for a certain length of time. The cloth is guaranteed to give continuous use for one year and should be investigated by every automobile owner.

Subscribe to the "Automobile Dealer and Repairer," $1.00 Per Year.

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Odd or Irregular Sizes
BRAENDER TIRES

Trade Mark

The manufacture of many odd or irregular sizes and types of tires has been discontinued as a conservation measure on the order of the War Service Committee of the War Industries Board.

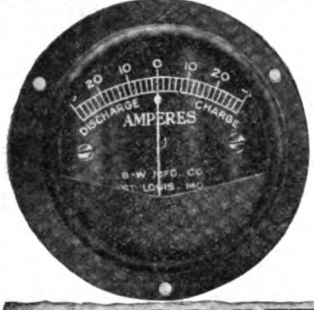
We have many of these odd or irregular sizes in stock that were manufactured previous to the date when this order became effective. We have also the list of many odd or irregular sizes in the hands of our various dealers.

If you use odd or irregular sizes, send at once for prices and further information.

BRAENDER RUBBER & TIRE CO.,
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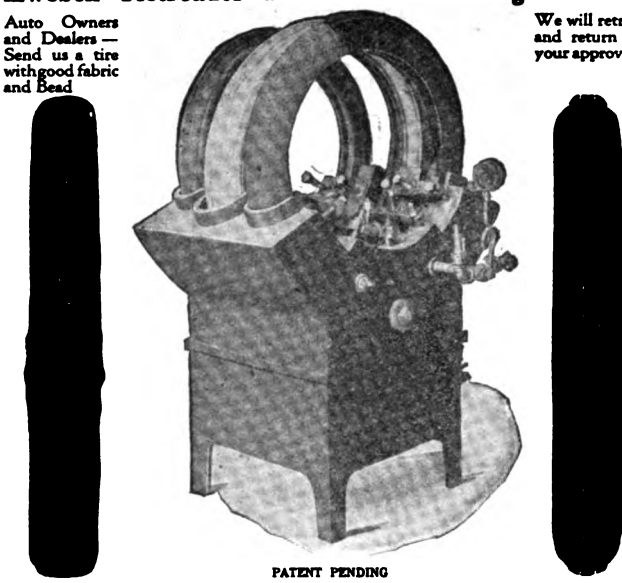
AMMETERS

Big Business—Splendid Profits

Zwebell Retreader and Tire Rebuilding Machine

Auto Owners and Dealers—Send us a tire with good fabric and Bead

We will retread and return for your approval.



PATENT PENDING

Never in the history of the tire business has the demand for rebuilt tires been so great as it is in this day of eliminating waste. You don't have to create the field—the field for your action is already created—it is a tremendous one and only waiting for more men. There will be no long drawn-out delay—you can go at it right now. We will post you on every point in rebuilding tires in sections and complete. This outfit pays for itself in so short a time, that it's surprising that anyone should hold back at all. It is a permanent business that will grow along with you as long as you live and then some. **The Zwebell Retreader** Has the Widest Range of Usefulness of Any Tire Machine on This Earth—It Has No Equal. Big designing engineers say so, and you want the best or none at all. Did you ever see a tire repairman who didn't have *more* than he could attend to? What are *you* doing—looking at the other fellows getting all the money and you just folding your hands? We will put you in "the swim" quick but you must write us a letter today—and don't fail to do it. We will explain everything—nothing will be left untold. This is the logical business for the Automobile Dealer, Garageman, Filling Station, to go into during this time—Conserve. Send for sample section of work done on this machine.

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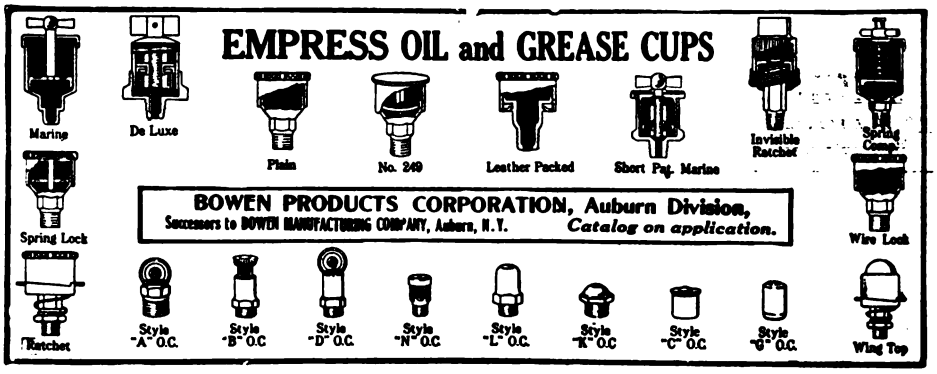
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Valuable Free Booklet.

If our subscribers are interested in winter driving they should write S. C. Johnson & Son, Dept. A. D. R. 9, Racine, Wis., for their latest booklet relative to the radiating systems of automobiles, trucks and the cooling systems of farm power machines.

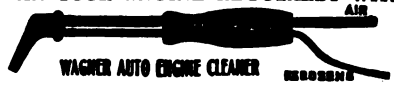
This little booklet contains many suggestions of value to anyone who works or runs gasoline engines. The product known as Johnson's Freeze-Proof is described and the booklet tells all about it. Freeze-Proof will protect the cooling system to 50 degrees below zero; it will not evaporate; it will not clog the radiator nor damage the metal, rubber hose or any other part of the engine. The cost is so low that every reader should investigate it. At any rate he should have the booklet, which is sent free upon application.

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BOWEN PRODUCTS CORPORATION, Auburn Division,
Successors to BOWEN MANUFACTURING COMPANY, Auburn, N.Y. *Catalog on application.*

CLEAN YOUR ENGINE REGULARLY WITH A



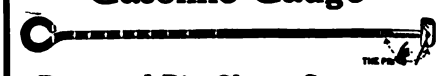
One qt. kerosene and 6 lbs. air pressure cleans all dirt, grit and grease from engine. Prevents wear, actually saves half the usual repairs. Quick, economical, thorough, easy and cleanly to operate. Necessity for repair shops.
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These brushes are made of the highest grade bristles and hair, prepared by special processes which retains the toughness and elasticity of the fibre. Every bristle is held firmly by its setting of rubber, vulcanized into the base of the bristles in a solid mass. Interested autoists should send for an illustrated catalog.

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Get our special price on new tires

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Exceptional Values
IN
DOUBLE CHAIN STITCHED TIRES

Size	Plain	Non-Skid	Size	Plain	Non-Skid
28x3	$4.50	$5.00	35x4	$10.00	$11.00
30x3	5.50	6.00	36x4	10.00	11.00
30x3½	6.50	7.75	34x4½	11.00	12.00
32x3½	8.00	9.00	35x4½	11.00	12.00
31x4	9.00	10.00	36x4½	11.00	12.00
32x4	9.00	10.00	37x4½	11.00	12.00
33x4	9.00	10.00	35x5	11.00	12.00
34x4	10.00	11.00	36x5	12.00	13.00
			37x5	12.00	13.00

Have your own tires Double Treaded by the same process. Our charges are only 40% off the above mentioned prices.

Send your order to our nearest office.

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DOUBLE TREAD TIRES—We carry a full line of new and used tires and tubes. Ginsberg & Berkowitz, 236 W. 48th Street, New York City.

INSYDE TYRES,

inner armor for automobile tires. Double mileage. Prevent punctures and blowouts. Details free. Agents wanted. Big profits.

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WANTED—Man experienced on tire and tube repair work. One who is able to assume responsibility and manage the Department. Excellent opportunity. Write stating experience, salary desired and draft classification to the Norwalk Tire & Rubber Company, Norwalk, Conn.

For Sale

PYRMA ALUMINUM HEEL PLATES cover or prevent unsightly holes in floor board coverings, 75 cents each. These plates and PYRMA ALUMINUM MATTING for sale by all up-to-date dealers. Metallic Automobile Matting Co., Rochester, N. Y.

FOR SALE—Patent No. 1238050 for making easy removal of tire or demountable split rims. Have a working model. For particulars address Charles A. Peterson, Fields Landing, Cal.

Tires

BUY EARLY AND SAVE MONEY
Double Tread Tires and Tubes

GUARANTEED

Come to the Tire Clearing House—here are prices—clear cut and plain as daylight. We buy wholesale the best "try out" Tires—and you get the benefit—you want truthful tires, and truth is never crushed to earth if given a square deal—real truth is puncture proof—

SO ARE OUR TIRES.

Size	Plain	Non-Skid	Tubes
28x3	$4.40	$4.95	$2.00
30x3	5.50	6.05	2.00
30x3½	6.60	7.15	2.50
32x3½	7.15	7.70	2.75
34x3½	8.25	8.80	3.00
30x4	7.70	8.25	2.75
32x4	8.80	9.35	3.00
33x4	8.80	9.90	3.50
34x4	8.80	9.90	3 50
35x4	9.90	11.00	3.60

Get your order in quick for goods listed here—by all means get in touch with us for further information about our special process—it means money in your pocket. Get in right—write today—yes—today.

Look up rating in Dunn's or Bradstreet's.

Size	Plain	Non-Skid	Tubes
36x4	$9.90	$11.00	$3.60
32x4½	9.90	11.00	3.75
34x4½	11.00	12.10	4.00
35x4½	11.00	12.10	4.10
36x4½	11.00	12.19	4.25
37x4½	12.10	13.20	4.35
34x5	11.00	12.10	4.50
35x5	13.20	14.30	5.00
36x5	13.20	14.30	5.00
37x5	13.75	14.85	5.00

For (non-skid) sizes up to 32x4, 50c extra; all other sizes $1.00 extra.
For rebuilding your old tires we charge you 60% of the above prices.

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PRICE WRECKERS
Double Tread Tires with Double Lock Stitch

30x3	N. S.	$5.50	34x4½	N. S.	$8.50
30x3½	"	6.50	35x4	"	9.00
32x3½	"	7.00	36x4	"	9.50
31x4	"	7.25	36x4½	"	10.00
32x4	"	7.25	36x5	"	10.00
33x4	"	7.50	37x4½	"	10.00
34x4	"	8.00	37x5	"	10.00

We carry a full line of Firsts and Factory Blemished Tires and Tubes at moderate prices.

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STODDARD DAYTON PARTS
Pullman & Regal Parts

rear axle bevel gears and pinions

These are all new parts.

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Dealers in Magnetos of all Makes. Lighting Systems and Self Starters.

Expert Repairing of All Makes.

Express your Magneto, Starter and Generator to us. Same will be repaired and returned same day as received.

Distributors and Service Station for

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230 WEST 49th STREET NEW YORK CITY

Patent Attorneys

PATENTS SECURED—C. L. Parker, Patent attorney, McGill Building, Washington, D. C. Inventor's Handbook upon request.

RALPH N. FLINT, M. E.—Attorney-at-law in Patent Causes, late Assistant Examiner Internal Combustion Engine Division, U. S. Patent Office. Specialist in Internal Combustion Engine Cases. 2 Rector Street, New York, N. Y.

PATENTS PROCURED AND TRADE-MARKS REGISTERED—Eighteen years' experience. Instructions and Terms on request. Robb & Robb, Attorneys at Law, 888 Southern Bldg., Washington, D. C. 1340 Schofield Bldg., Cleveland, Ohio.

PATENTS—Don't lose your rights. Send for blank form "Evidence of Conception" to be signed and witnessed. Establish your rights in the start. Form and information concerning patents free. Lancaster and Allwine, 212 Ouray Bldg., Washington, D. C.

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Tire Dealers

COMPLETE STOCKS IN

ALL STANDARD MAKES at Last Spring's Discount

Write for Stock Sheets and Prices

JANDORF AUTO CO.
1768 Broadway, NEW YORK CITY

Auto Accessories

IGNITION, STARTING-LIGHTING
Genuine Parts only used in repairs.

K-W Magnetos -:- Zenth Carburetors

CLEVELAND IGNITION CO.
1845-47 Euclid Ave., CLEVELAND, OHIO

NOTICE, REPAIRMEN!—If you repair Ford cars you need our line of cylinder reamer motor stands, quick-raising jacks, portable hoists, straightening presses, speed tools and wrenches. Geneva Machine Works, Geneva, Indiana.

If it's for a "Ford" car we have it. Write for catalogue and price list. If it's for a "Ford" car we have it. Universal Motor Supply Co., White Plains, N. Y.

AUTO TOP ROOF OR SEAT COVERS, $7 and up. Parcel post prepaid. Easy to apply. Samples of cloth free. Auto Equipment Co., 310 8th St., Cincinnati, O.

VULCANIZING USED AUTO-TIRES is a growing and profitable business, especially now. Government orders 50% reduction in the manufacture of new tires. Easy to learn. Instruction book, $1. Plants, $50 and up. Catalog free. Equipment Co., 304 8th st., Cincinnati, O.

LATHE FOR GARAGES

2 or 3 screw cutting lathes suitable for repair work in garages.

Send for our latest list of used machinery.

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3 Fox Street, BRIDGEPORT, CONN.

Radiators and Lamps

WE REPAIR Lamps, Radiators, Windshields and Fenders, of every description. Largest repair plant in New York. Great accessory bargains on hand for immediate delivery.

HUDSON AUTO LAMP WORKS
141 West 54th Street, New York City

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AUTOMOBILE INSTRUCTION—The West Side Y. M. C. A. Automobile School gives a practical course in shop and road practice in four or eight weeks, day or evening. Provision made for out of town men. 322 West 57th St., New York City.

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RECTIFIERS to charge from A-C circuit 1 to 8 ignition lighting or starting batteries at one time, $12.00 upward. American Battery Co., 1136 Fulton St., Chicago, Ill.

Cylinders Reground

ATTENTION

Those Requiring the Very Best in

CYLINDER GRINDING

fitting with light grey iron pistons, leakless rings, hardened and ground pins, our work has no comparison with the ordinary, now obsolete heavy type pistons and rough boring jobs. We grind our cylinders to one-half thousandths, mirror finish. We grind our pistons on the highest grade machines to fit, two and one-half thousandths clearance. We use the McCadden leakless piston rings. Work all reassembled ready for installation. All work positively guaranteed.

Patterns and castings in stock for every make of motor.

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The Name

BUTLER

Stands for Perfection in Cylinder Regrinding Oversize Pistons, Rings and Pins

Guaranteed workmanship, material and engineering at the right price

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CYLINDER GRINDING on automatic machinery by skilled mechanics at prices that will interest you. Gears, axles, valves and parts of all kinds made of high grade alloy steel. Send us your worn or broken parts and we will replace them. Oxy-Acetylene Welding. Cracked cylinders a specialty. Adapt Machinery Co., 1632 So. Wabash Ave., Chicago, Ill.

New Amazon Cord Supertire.

A new, massive cord tire has just been announced by The Amazon Rubber Company of Akron, Ohio, which will be called the "Amazon Cord Supertire."

Of multiple ply construction, each cord is separted from the others by an insulation of rubber—each cord performs its functions independently, friction and consequent heat are impossibilities. Its increased air space gives unusual buoyancy and resistance to stone bruises.

Almost three-quarters of an inch of sturdy side-wall above the bead makes it mechanically impossible for rim cuts to occur. The heavy tread is of the same design and compounding as the regular fabric Amazon Supertire.

The new cord has a jet-black, ebony tread with a broad pearl grey side-wall, and at present is being made in the following sizes:

34 x 4½, 36 x 4½, 35 x 5, 37 x 5 and 36 x 6.

Piston Rings

PISTON RINGS

QUALITY SUPREME
PRICES RIGHT

All sizes in stock

Interesting proposition for agents

Houpert Machine Co.
Harris Ave. and Marion St.
Long Island City, N. Y.

Motor Truck as an Aid to Busines

The A. W. Shaw Company, 461 Fourth Ave., New York, as well as of Chicago, Ill., recently published an interesting book entitled "The Motor Truck as an Aid to Business Profits." This book should be in the hands of every business man who operates a fleet of trucks or even a single machine. It tells how to figure truck costs, how to cut down operating expenses, approximate oil and fuel costs, and gives many actual examples of truck operation.

The book is bound in blue library buckram, contains 540 pages, 335 photographs and drawings, charts, folded inserts, blue prints and tables touching every phase of the motor truck's relation to the profit side of any enterprise.

Weaver Garage Equipment.

We want to call the attention of our readers to the interesting line of garage equipment carried by the Weaver Manufacturing Co. of Springfield, Ill., and ask them to write for an illustrated catalog, if they are in the market for garage appliances.

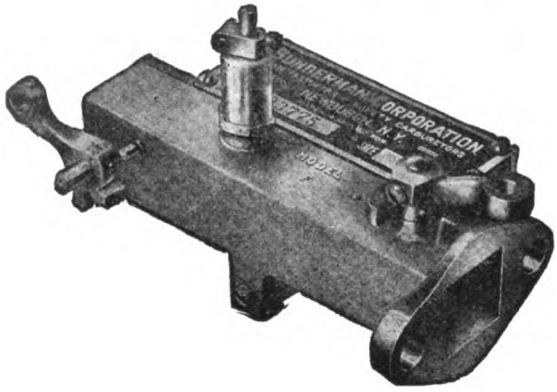
Especially we mention the Weaver Towing Pole, a device which will be appreciated by anyone who has ever had to tow a disabled car by means of an ordinary line, with the attendant possibilities of collision and other dangers.

The Weaver towing pole is of special design and fitted on each end with wide malleable sockets, padded with leather to prevent damaging the paint of the cars. Heavy straps of the best harness leather, 30 inches in length, give the pole a practically unlimited range of application, either to axle spring or frame.

While the pole itself is sufficiently rigid to enable the one car to control the other, the heavy coil spring cushions all pulling or jamming shocks, so that there is no jerk or jar on either car. This spring is double acting and is of the proper tension to respond to the weight of any car.

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SUNDERMAN
Vacuum Carburetor



Model F — *For Ford, Metz and Saxon Four* — F. O. B. Newburgh, N. Y. — **$7.50**

Model BB—for all other cars—without connection **$10**

With regular connection **$12**

The Sunderman Saves More Than Your Share

It Makes "Slacker" Motors Hustle

THE advertising of the Sunderman Carburetor for the last two and a half years has persistently enunciated the great principle of gasoline conservation.

The need for saving gasoline is now three years old—it was the fall of 1915 that saw the rapid increase in price that told of demand nosing out supply.

Now the Government Speaks

In no uncertain tones, even though they are velvety in their soft suggestion, the Fuel Administration says "save gasoline." Your saving must go a step beyond your patriotism now—you must save; you have no option about it—we need the gasoline to help in winning the war.

Let Your Patriotism Be Intelligent

The Sunderman Carburetor will save far more gasoline on your car than the authorities hope to get from you in its one "gasless" day a week.

It will save it without sacrificing anything—it will give even more power and more flexibility—and while saving the gasoline and keeping your car running it will save on a busy car more money than is needed to pay whatever tax the government may impose.

Dealers, You Must Point Out the Way

The Sunderman principle of carburetion automatically saves gasoline. It saves from 30 to 50% on any car—and is saving even a greater percentage on the cars of thousands of satisfied owners who send us enthusiastic, unsolicited testimonial letters — we receive them in every mail.

There is far more power in gasoline than the ordinary carburetor gets out of it. The ordinary mixture is not fine enough. No matter how you skimp down in throttling—no matter to what degree of leanness you adjust—you cannot get the power out of ordinary carburetors unless you feed more gasoline.

The Sunderman Gives MORE Power With a LEANER Mixture

Our carburetor vaporizes the gasoline. It breaks up the gasoline particles to infinite fineness, until only a gas cloud enters the combustion chamber. But this gas cloud is all power—and the result is a greater amount of driving force from the same amount of gasoline. Or, the same amount of driving force from a smaller amount of gasoline.

It saves without sacrificing power—and at the same time furnishes a "snappier" mixture that means a wider flexibility, a faster getaway and all the other ideal attributes of good carburetion.

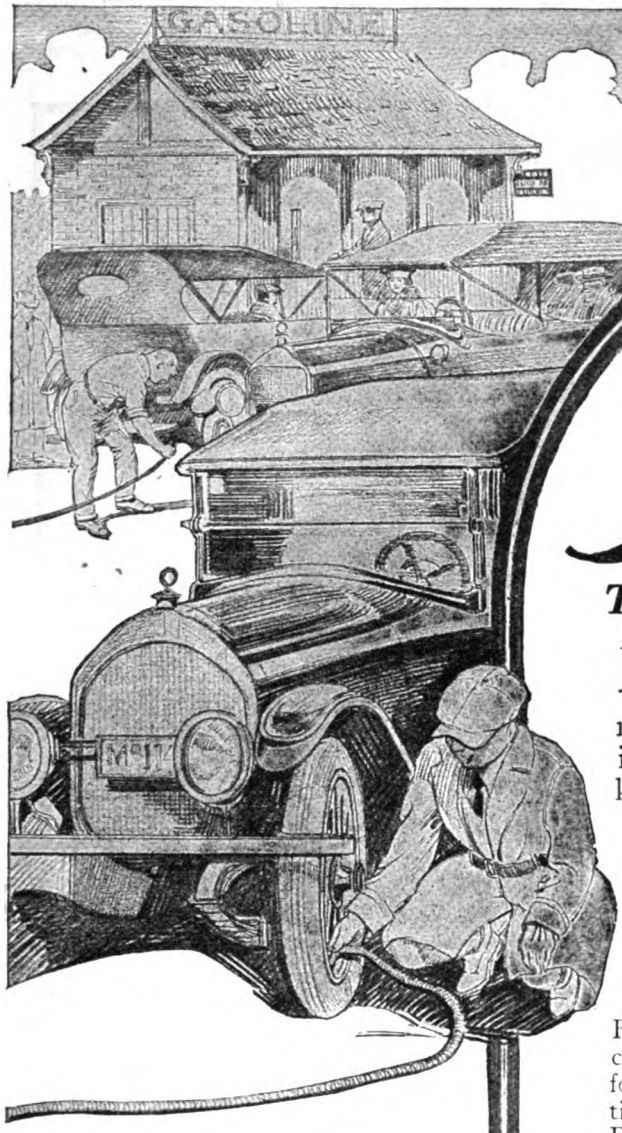
Ask your dealer—or order at once from us.

Dealers: Don't wait for our Salesmen to call—Send us a sample order at once.

Sunderman Corporation, 13 Chambers St., Newburgh, N. Y.

PACIFIC COAST BRANCH: 593 MARKET ST., SAN FRANCISCO, CAL.

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CURTIS ST. LOUIS

FREE CURTIS-AIR FREE FROM OIL

This Sign

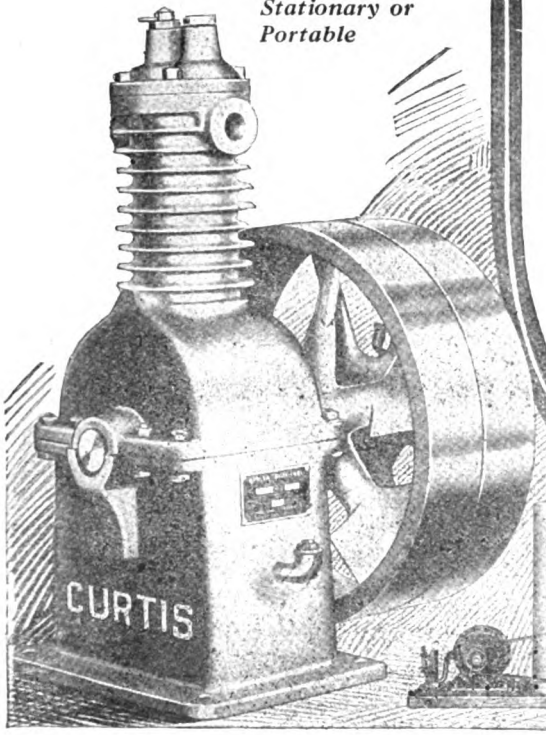
Talks Tire Conservation

IT is furnished free with each CURTIS Garage Air Compressor and can be had in no other way. It's a sign of progress—inspires confidence and carries a slogan known to motorists the country over.

Install a Curtis Air Compressor

Furnish your patrons with CURTIS AIR—FREE FROM OIL—and watch the cars line up before your curb. Motorists know that the average air compressor forces oil through the air line—they know that oil rots tires, and they are looking for CURTIS AIR—FREE FROM OIL—because it helps them get greater mileage out of their tires and cuts down expenses—big items in these days when tire prices are steadily advancing.

Five sizes—Stationary or Portable

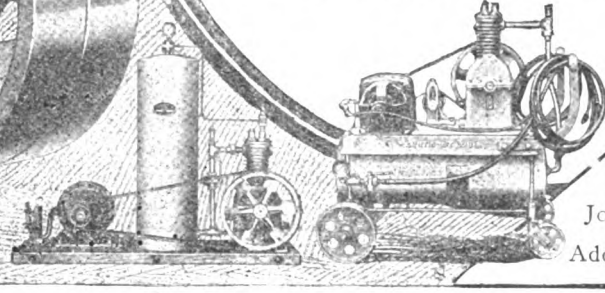


Exclusive Curtis Features

Patented controlled splash oil system. Less oil required. No grease nor oil cups. AIR FREE FROM OIL. Large fan fly-wheel keeps compressor cool. Hand unloader permits starting against pressure. Bearings renewable, adjustable, non-cutting. Fewer parts—reducing maintenance cost. Easiest to install—no special base required.

Ask your jobber—or fill out and mail us the attached coupon for full information.

Curtis Pneumatic Machinery Co.
1530 Kienlen Avenue St. Louis, Mo.
Branch Office—530-E Hudson Terminal, New York City



Cur
Pneuma
Machinery C
1530 Kienlen A
St. Louis, M

Gentlemen:—Please se
me full details on Curtis
Compressors—your proposit
and low prices.

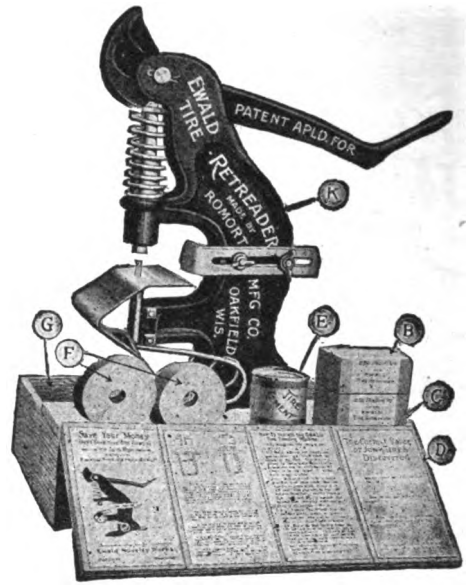
Name.....
Address.....
Jobber's Name.....
Address.....

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TRADE MARK Ewald

Tire Retreader Outfit

A.—RETREADING MACHINES
B.—250 SPECIAL STAPLES, ½-IN. LONG
C.—250 SPECIAL STAPLES, ⅝-IN. LONG.
D.—FULL SHEET OF DIRECTIONS
E.—1 CAN TIRE CEMENT
F.—2 ROLLS RUBBER RELINER
G.—1 SHIPPING BOX



It is easy to staple 10 tires a day with the Ewald Tire Retreader at $2.50 per tire.

How would you like to make $25.00 and over per day or $650.00 per month?

Here is a chance for the Tire Repair Man to coin some money.

Auto drivers will have to have their tires repaired because the Government is taking 70% of all the rubber. It is up to the Repair Man to help save all the tires he can.

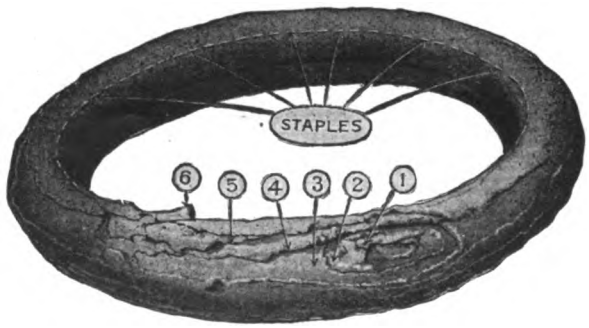
One Repair Man Writes:

"IT PAID FOR ITSELF THE FIRST DAY"

Save Your Money—Don't Give Your Old Tires to the Junk Man

—INSTALL AN—

TRADE MARK Ewald **Tire Retreader**



The above tires were stapled by the Ewald Tire Retreader and then run over two thousand miles. You can see the fabric at 1, 2, 3, 4, 5 and 6 as it wore away, but not a single staple pulled out.

For Sale by Dealers and Jobbers Everywhere

Hundreds in Daily Use, and Thousands of Tires Are

Saved by the TRADE MARK Ewald Process

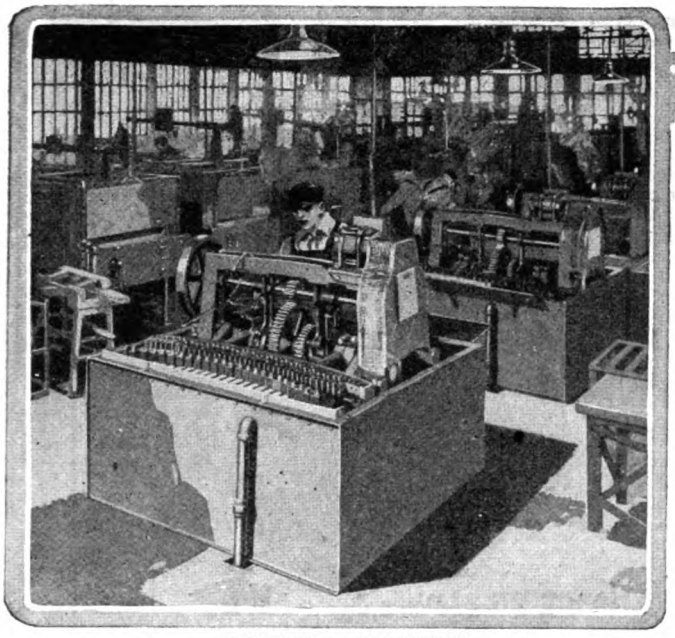
Every Tire Repair Shop Needs One

Manufacturers

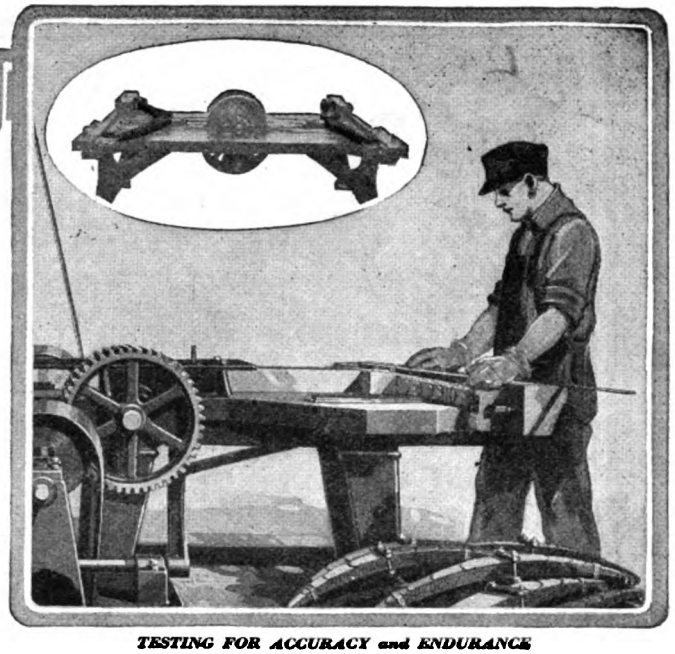
Romort Mfg. Co., Oakfield, Wis.—Chicago, Ill.

Factory Sales Department: The Zinke Company, Chicago, Ill.

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FORMING and TEMPERING



TESTING FOR ACCURACY and ENDURANCE

Resiliency·Endurance·Accuracy

A REPLACEMENT SPRING, to be worth its price must combine three things: Resiliency, Endurance and Accuracy. And of these three Accuracy is the most essential.

A spring must "fit like a glove" if it is to be resilient and durable. It must "fit like a glove" if it is to give satisfactory service.

Your business as a repair man depends on your ability to give satisfaction to customers. Our business depends on your success and patronage.

Knowing this, we have built our business on one policy: Satisfaction to Car Owners—Satisfaction and Profit to Dealers.

The Harvey Process is but a part of the Harvey Policy. Harvey Springs are scientifically made from the best spring steel obtainable. They are so carefully made and so thoroughly tested in design, material and workmanship that Resiliency, Endurance and Accuracy are absolutely assured.

If you are not already selling the Harvey Springs you should get in touch with us at once. It means satisfaction to your customers and profit to you.

There's a Harvey Jobber near you. Drop us a card and we will send you his name and our Spring Book containing specifications etc. of over 900 kinds of springs. Write today, you may need Harvey Help tomorrow.

Harvey Spring & Forging Co.

921 17th St. **Racine, Wis.**

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The "Y" and the WAR

When an officer said to Elsie Janis at the close of an entertainment in a Y.M.C.A. Hut: "You have kept my men from thinking of tomorrow's battle; they will fight better because of tonight," he expressed the big, underlying purpose of the Y.M.C.A. work. In other words, the

Y.M.C.A. is Helping Win the War

The Y.M.C.A. of wartime is vastly different from the Y.M.C.A. as most people know it. Its work has assumed tremendous proportions and achieved tremendous results. It is supplying a vital need—one that is not supplied in any other way. Its work is as important as that of any other organization which the war has developed.

Those of us who are bearing the lighter part of this great war burden must realize that it is not enough to raise and train an army. It is not enough to feed and clothe our men. It is not enough to care for those who are wounded. Soldiers are people, not machines. They must be kept mentally fit to make them efficient.



2,500,000 letters are written every day on "Y" Stationery

It has been demonstrated—is being demonstrated all the time—that the nation gives freely for the building of ships, for the manufacture of munitions, for the housing, clothing and feeding of our fighting men and for providing medical aid to those who are wounded. It will give just as freely when it understands that without the games, shows, stores, reading, educational courses and home comforts which the "Y" provides, all this other giving will be futile.

Consider yourself in relation to your own work. Suppose you were taken from your job, removed to another town and put to work. Suppose at the end of each day's work you ate your supper, went to bed, got up in the morning, had your breakfast went to work and kept this up for weeks and months—nowhere to go in your idle time; nothing to do; no friends who cared about you. How long could you keep it up? How long could you do your work? That would be the soldier's life without the "Y."

Somebody said, "beware of the army that sings." Armies do not sing in response to orders. They do not sing because of the joy of fighting. They sing because their spirits are high, because they are mentally, morally and physically fit; and it is this condition of mind and body, this building up and maintaining of the morale of our men, which is the deciding factor between a victorious and a defeated army.



Everything is free in the front line canteens

Four allied activities, all endorsed by the Government, are combined in the United War Work Campaign with the budgets distributed as follows: Y.M.C.A., $100,000,000; Y.W.C.A., $15,000,000; War Community Service, $15,000,000; American Library Association, $3,500,000.

Contributed through Division of Advertising

U. S. Gov't Committee on Public Information

This space contributed for the Winning of the War by

MOTOR VEHICLE PUBLISHING CO., Publishers of the AUTOMOBILE DEALER AND REPAIRER

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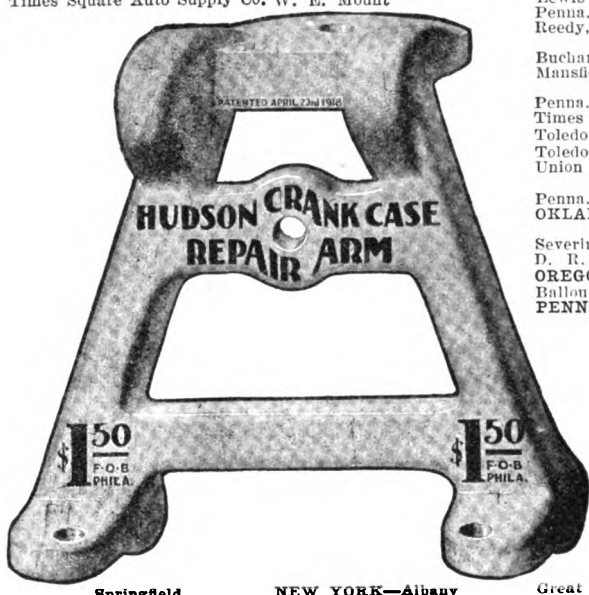
THIS PATENTED INVENTION PRODUCES PROFIT AS A TIME SAVER IN BOOSTING CUSTOMERS THROUGH MORE BUSINESS AND MORE MONEY TO YOU

Don't take off the Crank Case to weld a broken arm—it costs too much—altogether about $25.00. Use this arm next time she breaks. Jack up the motor, bolt on the arm and in 15 minutes the job's done.

IN STOCK WITH DEALERS AND JOBBERS IN THE UNITED STATES AND CANADA

If your jobber's name is not here, tell us. We will wake him up—or try to.

ALA.—Montgomery
Loeb Hardware Company
Birmingham
Moore Handly Hardware Co.
ARKANSAS—Little Rock
Arkansas Auto Appliance Co.
CAL.—Los Angeles
E. A. Fentherstone
Weinstock-Nichols Co.
San Francisco
W. E. & W. H. Jackson
McCoy Motor Supply Co.
Chanslor & Lyon Co.
CONN.—Bridgeport
The Post & Lester Co.
Hartford
The Post & Lester Co.
New Haven
Hessel Hoppen Co.
Henry Horton
C. S. Mersick
The Post & Lester Co.
Sam Schwarz
DELAWARE—Wilmington
Auto Supply Co.
Delaware Hardware Co.
Wilson Hardware Co.
DISTRICT OF COLUMBIA
Washington
Charles Rubel & Co.
Federal Auto Supply Company
GEORGIA—Athens
Griffith Implement Co.
Atlanta
Alexander Seewald
Columbus
W. E. Cody Co.
ILLINOIS—Chicago
Automobile Supply Co.
Beckley Ralston Co.
Chicago Auto Equipment Co.
Chicago Auto. Supply House
W. R. Damon
Electric Appliance Co.
Gray Heath Co.
Hudford Co. of Chicago
New England Mills Co.
United States Rubber Co.
Danville
E. B. Collins Co.
Peoria
Graham Seltzer Co.
Kelly Supply Co.
Quincy
Tenk Hardware Co.
Washington
Washington Auto Supply Co.
INDIANA—Fort Wayne
Lomont & Company
Ft. Wayne Iron Store Co.
Indianapolis
The Gibson Co.
H. T. Hearsey Co.
W. J. Holliday & Co.
Universal Accessories Co.
W. R. Wheeler
IOWA—Des Moines
Herring Motor Co.
Hippee States Company
Times Square Auto Supply Co.
Burlington
Robert Donahue Iron & Hdwe.
Council Bluffs
Rothert Motor & Supply Co.
Sioux City
Schultz Auto Supply Co.
Wm. Warnock Company
KANSAS—Atchison
Blish, Mize & Silliman Hdwe. Co.
Liberal
Liberal Auto Supply Co.
Salina
The Lee Hardware Co.
The Watson Weldon Durham Co.
Topeka
Southwick Auto Supply Co.
W. A. L. Thompson Hdwe. Co.
Wichita
The Massey Iron Company
Times Square Auto Supply Co.
Shattuck, George, Co.
The Johnson Bros. Auto Supply Co.
KENTUCKY—Louisville
Belknap Hdwe. & Mfg. Co.
Andrew Cowan & Co.
Harbison & Gathright
Kentucky Auto Supplies Co.
Penslee-Gaulbert Co.
Welborne & Co.
LOUISIANA—New Orleans
Electric Appliance Co.
MAINE—Portland
James Baily Co.
L. W. Cleveland Co.
W. E. & B. J. Harmon
MARYLAND—Baltimore
Baltimo.Hub Wheel&Mfg.Co.
Chesapeake Tire & Rub. Co.
Piet, Robertson, Rdiney Co.
Seaboard Electric Co.
MASS.—Boston
J. H. & G. L. Atwood
George R. Bascom
Brophy, Barabee Co.
Chandler & Barber Co.
Jos. E. Greene Co.
Linscott Supply Co.
Malton Specialties Co.
Motor Car Equipment Co.
The Post & Lester Co.
United States Rubber Co.
Wetmore Savage Co.
Times Square Auto Supply Co.



Motor & Machinists Supply Co.
The Automotive Supply Co.
Times Square Auto Supply Co.
NEBRASKA—Hastings
J. H. Haney & Co.
Lincoln
Henkle & Joyce Hdwe. Co.
Omaha
Lee Coit Andressen Hdwe. Co.
Lininger Implement Co.
Master Sales Co.
Paxton & Gallagher Co.
United States Rubber Co.
Western Auto Supply Co.
NEW JERSEY—Newark
Economy Auto Supply Co.
Elin Auto Supply Co.
H-H-H Motor Supply Co.
Motor Car Equipment Co.
Thompson Reilly Co.
Paterson
H. Lund Smith
Englishtown
W. E. Mount
NORTH DAKOTA—Fargo
J. D. Grant
OHIO—Akron
Penna. Rubber & Supply Co.
Hardware & Supply Co.
Canton
Canton Auto Supply Co.
Young Auto Supply Co.
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Buchan Auto Supply Co.
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Toledo
Penna. Rubber & Supply Co.
Times Square Auto Supply Co.
Toledo Rubber Co.
Toledo Tire & Supply Co.
Union Supply Co.
Youngstown
Penna. Rubber & Supply Co.
OKLAHOMA
Oklahoma City
Severin Tire & Supply Co.
D. R. Thomas & Company
OREGON—Portland
Ballou & Wright
PENNSYLVANIA
Allentown
Chas. B. Scott Co.
Williamsport
Williamsport Saddlery Co.
Wilkes-Barre
American Auto Supply Co.
York
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RHODE ISLAND
Providence
C. A. Cady Co.
Combination Ladder Co
Congdon & Carpenter
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Anderson
Sullivan Hardware Co.
Charleston
Cameron & Barkley Co.
Florence
D. W. Alderman, Jr.
C. D. Franke Auto Co.
Piedmont
Hampton Mercantile Co.
S. DAKOTA—Sioux Falls
L. & L. Motor Supply Co.
TENNESSEE—Memphis
Times Square Auto Supply Co.
TEXAS—Dallas
Electric Appliance Co.
Times Square Auto Supply Co.
Austin
Walter Tips Co.
Fort Worth
Texas Auto Supply Co.
Houston
Peden Iron & Steel Co.
San Antonio
Peden Iron & Steel Co.
VIRGINIA—Charlottesville
Charlottesville Hdwe. Co.
Lynchburg
Economy Auto Supply Co.
Norfolk
W. M. Whaley Co.
Richmond
Benton Bailey Company
Benj. T. Crump Co.
Talman Auto Supply Co.
WASHINGTON—Seattle
Ballou & Wright
Washington Auto Supply Co.
WEST VIRGINIA
Parkersburg.
H. P. Dils
Wheeling
Earle Rogers Co.
WISCONSIN—Madison
L. F. Schoelkopf
Ph. Gross Hardware Co.
Milwaukee
Auto Supply Co.
Times Square Auto Supply Co.
Western Motor Supply Co.
CANADA—Montreal, Que.
Canadian Fairbanks-Morse Co., Ltd.
Calgary, Alberta
Motor Car Supply Co.
Wood, Vallance & Adams
Edmonton, Alberta
Motor Car Supply Co.
Hamilton, Ont.
Wood, Alexander & James
Kingston, Ont.
Edwin Chown & Son
Regina, Sask.
Independent Electric Co.
Saskatoon, Sask.
Bowman Bros., Ltd.
Western Motor Supplies, Ltd.
Toronto
W. R. Sachs
Windsor, Ont.
Universal Car Agency
Winnipeg, Man.
Merrick-Anderson Co., Ltd.
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Volcano Stables & Trans. Co.
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Pacific Commercial Co., New York City, Philippine Islands
Henry W. Peabody & Co., New York City, S. Africa

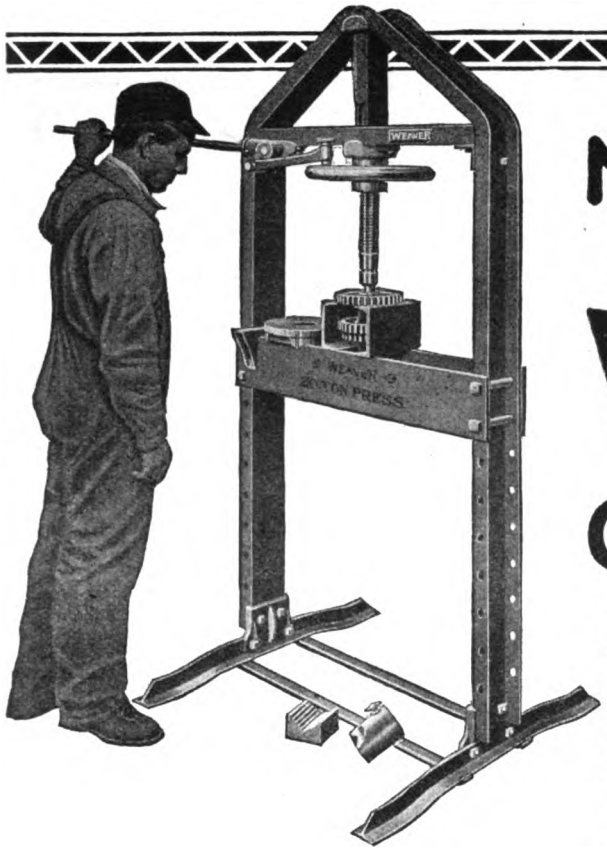
Springfield
Post & Lester Co.
Tarbell Watters Co.
Worcester
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The Post & Lester Co.
MICHIGAN—Detroit
Automobile Supply Co.
Bowman Gould Co.
MINNESOTA
Grand Rapids
Michigan Tire & Access. Co.
Tisch Auto Supply Co.
Minneapolis
Empire Tire & Rubber Co.
Reinhard Brothers Co.
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Wyeth Hardware Co.
St. Louis
Beck & Corbitt Iron Co.
Bittel Leftwich Co.
Campbell Iron Co.
Holtaus Sad'y & Auto Supplies Co.
Missouri Auto Specialty Co.
Neustadt Auto & Supply Co.
Shapleigh Hdwe. Co.
Sligo Iron Store
Straus Saddlery Co.
Wesco Supply Co.
St. Paul
Times Square Auto Supply Co.
Kansas City
Bonnitwell Calvin Iron Co.
Kansas City Auto Supply Co.

NEW YORK—Albany
Albany Hardware & Iron Co.
New York City
A. J. Picard & Co.
Auto Hdwe. & Equip. Co.
Chatfield's, Inc.
Hudford Sales Corp.
Lowe Motor Supplies Co.
Motor Car Equipment Co.
Richards Auto Supply Co.
Strong & Trowbridge Co.
Smith Worthington Co.
Times Square Auto Sup'ly Co.
W. E. Pruden Hdwe. Co.
Weaver Ebling Auto Co.
Westchester Accessory Co.
Whittmore-Sim Co.
Binghamton
Motor Equipment Co.
Rochester
Thos. J. Northway
Sidney B. Roby Co.
United States Rubber Co.
Brooklyn
Farrell Auto Co.
Martin Evans Co.
Buffalo
James G. Barclay
Benis, McCarthy & Rogers
Jos. Strauss Co.
H. D. Taylor
United States Rubber Co.
Middletown
E. E. Hunter
Newburgh
John G. Wilkinson Co.
Syracuse
Onondaga Auto Supply Co.
United States Rubber Co.
Utica
Utica Cycle & Supply Co.
NORTH CAROLINA
Rocky Mount
Dixie Sales Co.

Great Eastern Rubber Co.
Hersh Hardware Co.
Motor Accessories Co.
Harrisburg
Front Market Motor Sup'y Co.
Johnstown
Swank Hardware Co.
Lancaster
General Auto Supply Co.
Herr & Co.
Philadelphia
Auto Specialties Co., 156 N. Broad St.
Berrodin Rubber Co.
Cahall Motor Supply Co.
Gaul, Derr & Shearer Co.
Grim's Auto Supply Co.
Hudford Phila. Sales Co., Inc.
Interstate Rubber Co.
Jawer's Auto Supply Store
J. H. McCullough & Son
Miller & Ecret Co.
Geo. W. Nock Co., 1304 Race St.
H. C. Roberts Electric Co.
Standard Sup. & Equip. Co.
Supplee Biddle Hdwe. Co.
Times Square Auto Supply Co.
Pittsburgh
Auto Accessories Co.
Dyke Motor Supply Co.
Jackson Motor Supply Co.
J. & M. Auto Supply Co.
Lyle Brothers
Pittsburgh Auto Equip. Co.
Times Square Auto Supply Co.
United States Rubber Co.
Joseph Woodwell Co.
Reading
Bright & Co.
E. S. Youse Co.
Scranton
Lansing Hardware Co.
Times Square Auto Supply Co.

HUDSON MOTOR SPECIALTIES CO., 1932 Arch St., PHILADELPHIA, PA.

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Mechanics Won't Quit the Shop that Uses WEAVER GARAGE EQUIPMENT

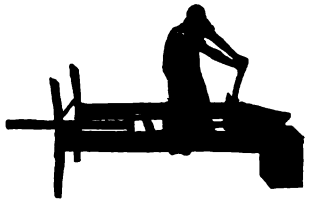
WEAVER GARAGE EQUIPMENT makes the mechanic's work so easy and pleasant that he will not leave a shop that is WEAVER equipped. WEAVER equipment takes all the heavy, tiresome part out of the workman's daily routine. He finds his work pleasant so he is satisfied to stay where he is.



WEAVER Garage Press Capacity 20 Tons

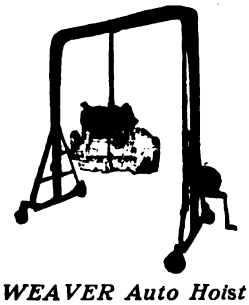
Let WEAVER Do the HEAVY WORK

The garage owner soon finds that WEAVER Equipment is a big money saver for him. Decreased time on each job soon means greatly increased profits—and this is what WEAVER Equipment accomplishes in any garage.



WEAVER Garage Press in position for handling crankshaft.

Work done by WEAVER Equipment shows a decided improvement in quality. A job can be done EXACTLY as it should be done. Strictly high class work can be done only with proper tools and equipment—and high class work is a business builder for any garage



WEAVER Auto Hoist

The WEAVER line is complete. We are specialists in this business and every WEAVER product is designed to serve a distinct purpose in the best possible manner.

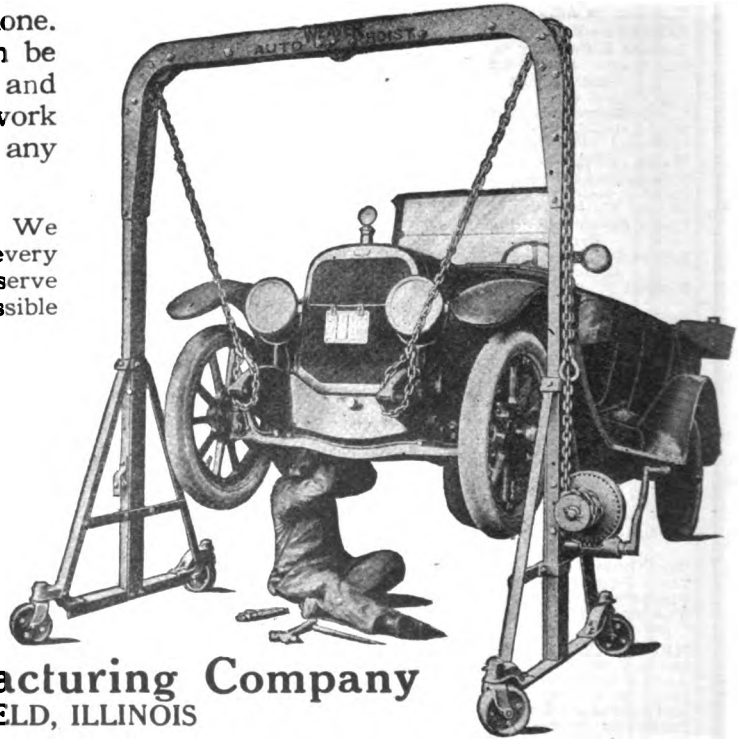
Drop us a line for a catalog illustrating and describing our complete line of WEAVER Garage Equipment.



WEAVER Auto Hoist

You will never know how efficiently your shop can be equipped until you have studied this line of products designed by experts.

Write Today



Weaver Manufacturing Company
SPRINGFIELD, ILLINOIS

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HALLADAY

(The Mark of Quality)

BUMPERS
And Automobile Accessories



The New Under Frame Clamp Bumper

For All Extension Frame Cars

This is the last word in universal bumpers, fitting practically all cars of standard construction without cutting or drilling the frame or aprons.

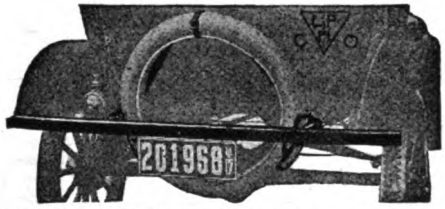
The Extension arm is bar steel combining light weight and greater strength.

Supplied with all HALLADAY bars in black Japan and nickel finish.

HALLADAY BUMPERS for FORD CARS

The HALLADAY Front Bumper for Ford Cars is the strongest and lightest on the market.

OUR NEW REAR FORD BUMPER



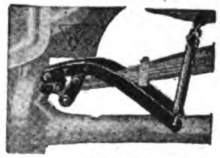
is supplied with or without the tire carrier.

It is secured to the car frame only, without cutting or altering.

The top support of the tire is an extension from the tire cradle and is in no way secured or attached to the car body.

HALLADAY FLEXLEVERS





The Most Efficient and Easily Attached Shock Absorber ever put on a Ford car.

The latest improvement includes **ALL STEEL CONSTRUCTION** double arms and springs, with hardened steel pins in malleable steel bearings.

Flexlevers are the only shock absorbers of this type that can be attached without removing the wheels or spring perches.

The HALLADAY Line

Also includes **Flexlevers** for heavy cars, **Double Arm Shock Absorbers, Tilting Steering Wheels, Can Tippers,** and other quick selling accessories.

Write for catalog and new price list in effect August 1st, 1918.

L. P. HALLADAY COMPANY

Streator - - - Illinois

STAR LATHES

Remember the Second Factor

The amount of work you can do depends on **two** factors.

First, the number and caliber of the men you employ.

And second—and equally important — the equipment these men operate.

For instance, the combination of features found exclusively in Star Lathes means that you can use "small lathes" for a far greater variety of work—either light manufacturing or repair work.

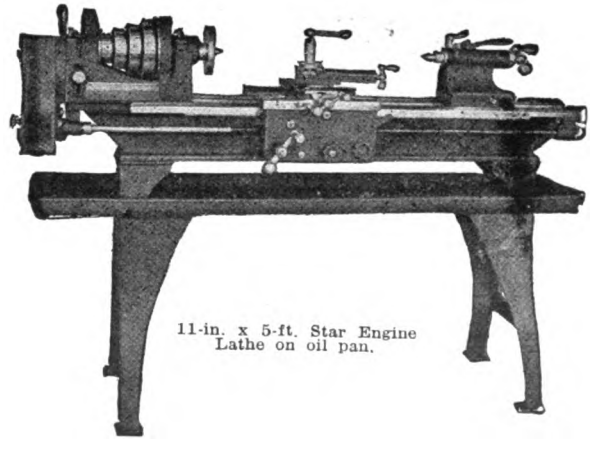
By using Star Lathes with their high accuracy instead of larger, heavier lathes, perhaps thought necessary, you get all of these advantages—

(1) Saving in floor space.
(2) Saving in first cost.
(3) Greater production through simplicity of Star Lathe operation.
(4) Saving in power.

The Star Lathe catalog has details. You should have a copy. Write for it now.

The Seneca Falls Mfg. Co., Inc.

383 Fall Street, Seneca Falls, N. Y.



11-in. x 5-ft. Star Engine Lathe on oil pan.

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AUTOMATIC CONTROL OF STEAM PRESSURE

For All Gas-Burning Vulcanizing Machines

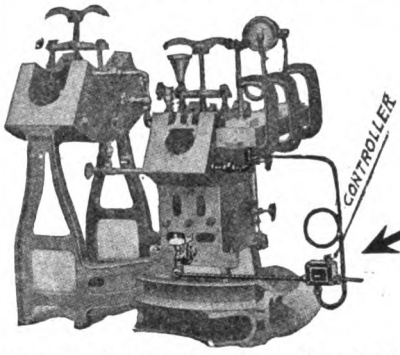
THE ALLIANCE CONTROLLER

All gas-burning Vulcanizers and Tube Plates should have Automatic Steam Pressure Controllers to insure proper and constant steam pressure.

The Alliance Controller automatically regulates the gas consumption and holds steam pressure at the desired point. It allows a full flow of gas to the burner to bring the steam up to the desired point quickly, and then automatically regulates the gas to the exact quantity needed to hold that pressure.

The Controller is easily adjusted and needs no further attention. Simply light your burner and forget it. Your steam will always stay at the pressure you want to carry.





Controller Installed on Akron-Williams Mold

The Controller can be easily and quickly attached to all makes of gas-burning Vulcanizing Equipment and Coil Steam Generators, and pays for itself through the saving in gas bills.

Complete Instructions with Each Controller. $7.50 Each

Send Money Order Now and Begin to Save

THE ALLIANCE CONTROLLER CO.
MAIN STREET
ALLIANCE OHIO
U. S. A.

CONSERVES COAL BY SAVING GAS

THIS TOP FOR

HUDSON.....CHALMERS
CHEVROLET....OVERLAND
MAXWELL.....CHANDLER
BUICK AND FORD CARS

CREATES PROFITS

No equipment line is superior to the Detroit All-Season Weatherproof Tops as a money maker for Dealers.

They sell day in and day out, the year 'round. Right now the demand is abnormal. Seems as if every new and old car owner is in the market for a weatherproof all-season top.

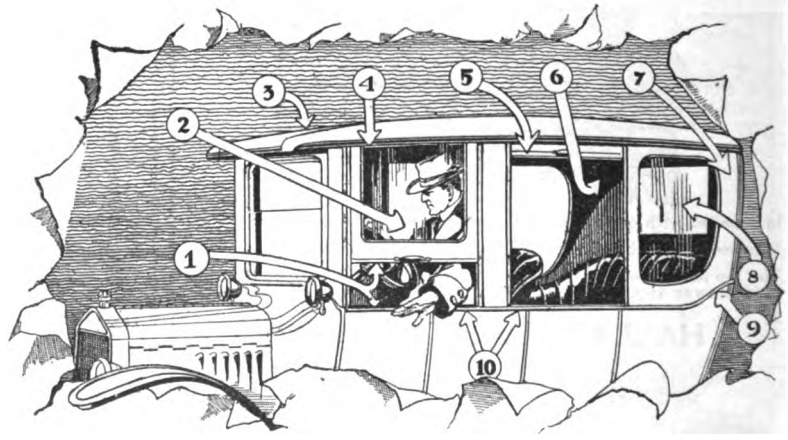
DETROIT
DETACHABLE
WEATHERPROOF
TOP

If you are not already handling the Detroit Top line—you should secure the agency for your territory immediately. They are the tops your customers want, and profit returns are large. Write us today.

DETROIT WEATHERPROOF BODY CO.
Saginaw Street, Pontiac, Michigan, U. S. A.

SHARRER PATENT TOP COMPANY
Telephone, Circle 1636
2 doors West of Broadway, 239 West 56th St., N. Y. City

Wholesale and Retail Distributors in Eastern New York, Connecticut and Northern New Jersey for Detroit Weatherproof Tops.



Superiority Features

1 All four door windows instantly raise or lower any desired distance for traffic signaling, ventilation or weather protection.

2 Windows in doors made of patented, anti-breakable, non-rattling, flexible Pyrolene—clear as glass.

3 Lightest all-season convertible top made, but so strong and durable it will outlast any car. Only weighs 75 lbs. more than ordinary touring tops. Will not rack small cars.

4 Air space between outer weatherproof covering and interior limousine lining make Detroit Tops cool in Summer—warm in Winter.

5 Windows in doors do not roll or crumple, but slide straight up and down, housed absolutely flat on top

6 Completely lined and trimmed inside with special limousine cloth

7 Patented long wearing waterproof outer covering.

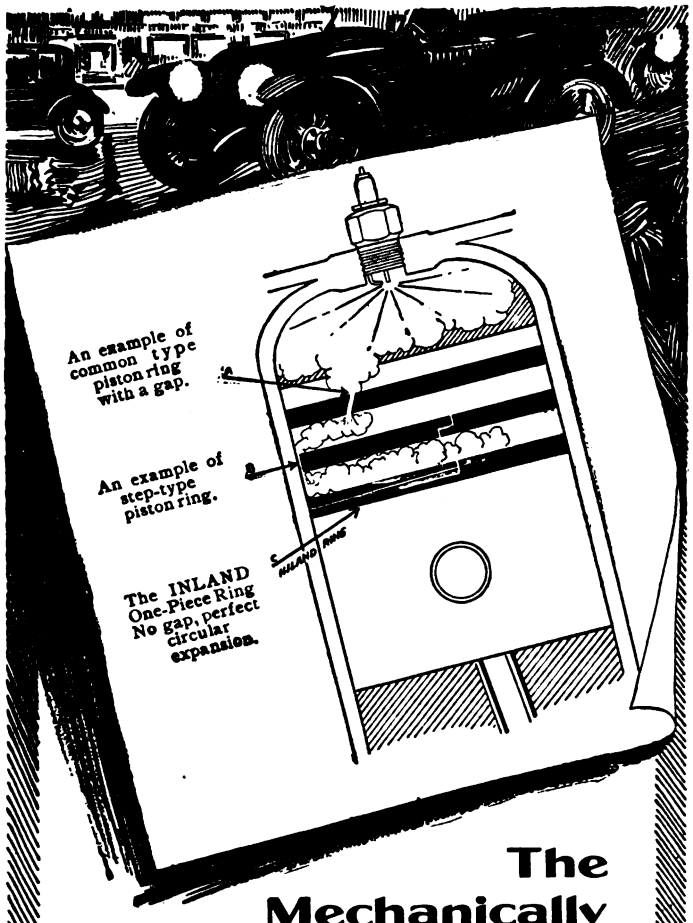
8 Glass where glass will not rattle.

9 Accurately fits on regular body irons and perfectly flush with top of body Does not mar deface or change car in any manner.

10 Extra wide upper doors afford easy entrance and exit under all conditions.

A Necessity—Not a Luxury. Makes a Wonderful Improvement in the Looks of Any Car

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The Mechanically Perfect Piston Ring

Anyone who knows the purpose of a piston ring, can see at a glance that the INLAND Piston Ring accomplishes this purpose better than any other type of piston ring.

The ordinary piston ring (A) has a gap through which compression can escape, causing loss of power and waste of gasoline and lubricating oil.

The step-type of ring (B) has no gap, but it fails to expand in a perfect circle and permits leakage along the cylinder wall where the pressure is uneven.

The INLAND Piston Ring (C) has *no gap* and its patented Spiral Cut causes it to uncoil in a perfect circle against the cylinder wall—making it absolutely proof against leakage.

That's why the INLAND Piston Ring has won the world's verdict as the *mechanically perfect* piston ring. That's why

3,000,000 INLAND Piston Rings are already in use.

Whether you are a manufacturer, dealer or user of combustion motors, investigate the INLAND Piston Ring.

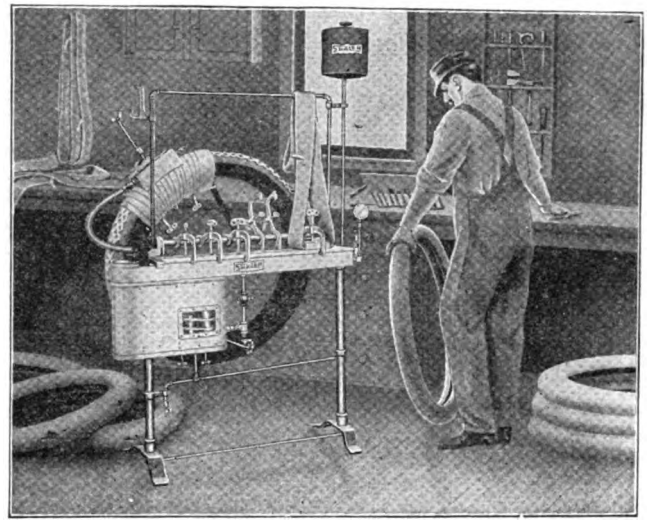
INLAND 1 PIECE PISTON RING



Inland Machine Works

802 MOUND ST., ST. LOUIS, MO., U. S. A.

Jobbers everywhere have Inlands



Make Money Now Repairing Tires

The increasing cost, and limited supply of tires makes it necessary for motorists to conserve their casings and tubes—to get the maximum mileage. Present conditions offer tire repair men a big opportunity to make money—and help win the war. Experienced help is not necessary. A boy can learn how to make perfect tire repairs in 30 minutes. Every car owner in your town is a possible customer. Jobs are plentiful, because tires blow out and puncture every day. Motorists are willing to pay liberal prices for repairing punctures, blow-outs, cuts, tears, rim cracks, etc.

SHALER SHOP VULCANIZER

Is the Only One That Has

Automatic Heat Control

Will do as much and as perfect work as the large, expensive vulcanizing outfits which cost from $250 to $500. The price of this Complete Steam Vulcanizing Plant—heated with either gas or gasoline—is remarkably low—$70 subject to Trade Discounts. Outfit shown above is Type N. P. R.—No. 41—other models heated by steam or electricity are described in our catalog.

It is portable—easily moved to any part of the shop—occupies but little floor space—a boy can operate it easily, and make perfect repairs. The Shaler Patented System of Automatic Heat Control regulates it automatically. It must vulcanize just right. Can't overcure or undercure, and requires no watching or regulating. Large capacity. Repairs 12 casings and 200 tubes a day. Handles any style or size of tube or casing.

The Shaler Wrapped Tread Method of tire repairing is used by all tire manufacturers. It mends casings and tubes quicker, better and at less cost. We furnish Complete Instructions with each outfit. So simple that anyone can do perfect work.

Ask Your Jobber—or Write for Catalog

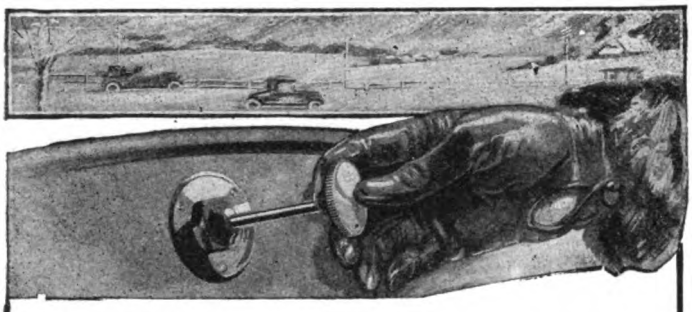
of the Complete Line of Shaler Vulcanizers for Repair Shops, Garages and Motorists' use.

C. A. Shaler Company

809 Fourth Street **Waupun, Wis., U. S. A.**

Oldest and Largest Manufacturers of Vulcanizers

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Sell This Auto Necessity—

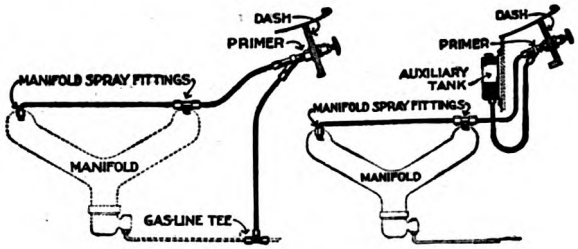
NOT AN ACCESSORY—

Of Six Years' Proved Success!

Garage owners and automobile accessory dealers will do well to concentrate on a real necessity—one that every motorist, every driver of truck and tractor appreciates—the Imperial Primer. Sell it because for six years it has led in demand and in satisfactory service, all other so-called accessories. Sell it now because WE CAN DELIVER ALL ORDERS!

Imperial Primer prevents the usual winter-time drain on batteries and self-starters, and assures easy, instant starting in the coldest weather. It's a life saver for Ford owners. As an evidence of their worth, Imperial Primers are installed as standard equipment on a number of well-known makes of cars.

Imperial Primer



No. 55-D

Primer Outfit With Gas Line Tee. - $5.50

consists of Primer Pump, Gas Line Tee, Manifold Spray Fittings and Tubing. Readily installed on any make of car, including Fords. When ordering No. 55-D Outfits, always specify outside diameter of main gasoline line tubing.

No. 56-D

Primer Outfit $6.00

is similar to No. 55-D, except that it has an Auxiliary tank which holds 1½ pints of gasoline, instead of the Gas Line Tee. All connections made with the well-known Imperial Compression Couplings.

Dealers and Jobbers: Imperial Primers make easy, profitable sales. Write today for complete details.

Owners of automobiles, trucks and tractors, who are unable to purchase an Imperial Primer in your vicinity, write us and we will send a complete outfit, prepaid, upon receipt of price. Easily installed, complete instructions with each outfit.

IMPERIAL BRASS MANUFACTURING CO.,
520 S. RACINE AVE.. : : : CHICAGO.

D & B Carburetor



Price with Auxiliary Air Control **$10.00**

Puts POWER and PEP in a FORD Motor.

Put one on yours and watch it Get Away and Keep on Going.

Simple, Springless, Efficient and Economical.

Measures the gasoline and air with the accuracy of a chemist's scale, without depending upon springs or other weak construction.

The metal float insures a constant gasoline level, unattainable in any carburetor dependent upon cork or floats of similiar construction.

A profitable proposition for all live dealers.

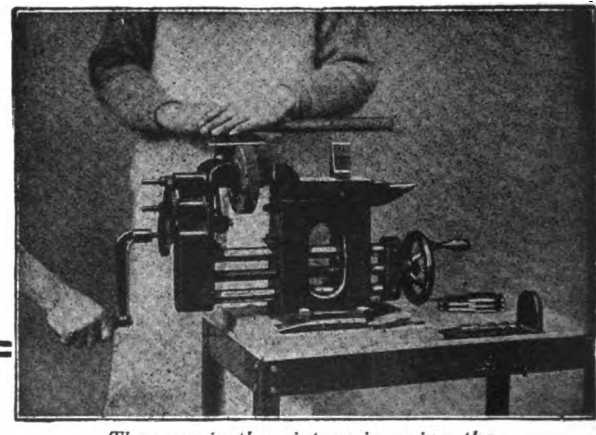
Write us or our distributors for details and prices.

Manufactured by

O. C. HARRINGTON CO.,
343 N. Crawford Avenue, Chicago, Ill.

Mid-West Distributors:
GRAY HEATH CO., 1440 Michigan Ave. Chicago, Ill.

New England Distributors:
The POST & LESTER CO., 112 Allyn St., Hartford, Conn.



The man in the picture is using the
STEWART HANDY WORKER FOR GRINDING
One of the many uses of the

GREAT 6-IN-ONE TOOL

It's a complete repair outfit. Includes strong practical anvil; powerful vise up to 4¼ inches; a sure-grip steel pipe vise; corundum grinding wheel, 5 inches by 1 inch; a two-speed drill press, with 2 drills; a metal cutting wedge and driving mechanism of three speeds—direct, 4 to 1 and 16 to one—easily regulated by changing handle grip. It operates grinding wheel, buffing wheel and many other similia r tools. All for $16.

ONLY **$16.00**

Send $2 with order. Pay balance on arrival. Get money back if not satisfied. Descriptive booklet mailed on request.

Chicago Flexible Shaft Co.
Dept. M, 12th St. & Central Avenue, Chicago.

Every private garage should have one. Every public garage needs at least one.

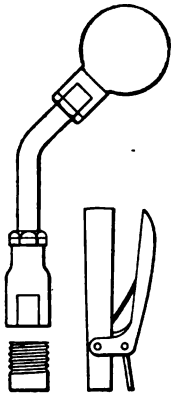
STEWART HANDY WORKER

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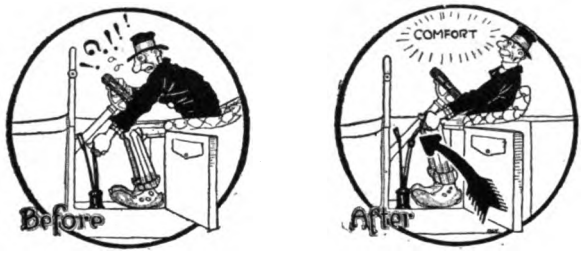
MELLIN'S GEAR-SHIFT EXTENSION

(Adjustable)



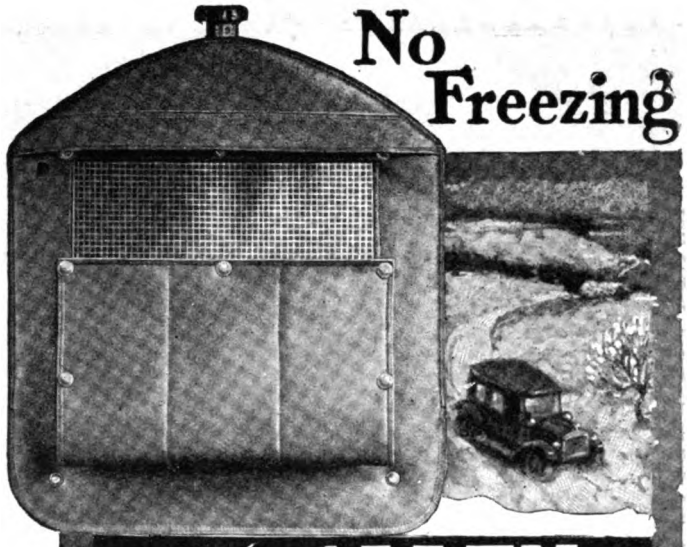
The *easy selling* acccessory that brings the shift-lever to just the *convenient* position for each driver. Over 25,000 are in use. Dodge, Overland 75-90, Nash, list $1.25. Buick, Reo, Oakland, and all cars having removable ball on top lever, list $1.50. Hudson Super-six, Overland 85, and all cars where ball is not removable and the extension clamps on, list $2.00. When ordering, give name and model of car. All goods shipped charges prepaid.

AT YOUR JOBBER'S



M. & H. NOVELTY CO., 857 E. 24th St., Los Angeles, Cal.

No Freezing



The ALLEN RADIATOR COVER

PROTECTS RADIATOR FROM FREEZING

Absolutely essential in cold weather. Quickly installed. Made in fabric leather—Moleskin back.

ALLEN AUTO SPECIALTY CO.

16 W. 61st St., New York City
2007 Michigan Ave., Chicago

NEW COOLING SECTIONS

FOR RADIATORS.

A new square tube honeycomb cooling section will make your radiator new again.

Ask us for information.

ROME TURNEY RADIATOR CO.,

Whitesboro Street ROME, N. Y.

THE

ARMSTRONG MFG. CO.

BRIDGEPORT, CONN., U. S. A. — **New York Office 248 CANAL ST.**

like their products, need no introduction to the experienced steam or gas fitter.

To others, our Catalogue No. 14 will show why we are so popular.



"Makers of Genuine ARMSTRONG Stocks and Dies."



Don't Wait Until Afterwards

Auto Smash! 3 Killed, 2 Fatally Injured. Due to Mistaken Signals.

This happens every day.

When will your turn come?

Prevent the accident by providing your car NOW with the

SMITH AUTO SIGNAL

It eliminates hand-signaling and tells definitely, positively and unmistakably what you are going to do. The burden of proof is then on the "other fellow." Don't wait until afterwards.

SMITH SIGNAL CORPORATION, Mfrs.

WEISS & SINCLAIR, U. S. Distributors

53-55 West 66th Street New York

(Representatives wanted)



REAR VIEW

Note how Smith Auto Signal shows to front and traffic policeman as well as to rear.

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REMEMBER

No Engine Is Better Than Its Cylinders and Pistons

If you are having carbon and oil trouble, excessive consumption of gasoline, a noisy and inefficient engine, have us

Regrind the Cylinders

Fit New Pistons, Rings and Pins

CHAS. R. BUTLER

EST - 1897

BUTLER MFG CO.

INDIANAPOLIS

INDIANA

1121 EAST GEORGIA STREET

Workmanship, Material, Price and Delivery Satisfy automobile owners all over the United States

Ask Your Garageman for Price and Full Information

Have You Had Trouble With Your Tires?

The fault is not with the tires. You, or your chauffeur, or both, are to blame. The responsibility is yours because you should keep the tires pumped up to a specified pressure, and don't.

Tires that are kept up to the proper air pressure last twice as long—sometimes ten times longer—than tires that are run with not enough air in them. Measure your air daily with a

SCHRADER UNIVERSAL TIRE PRESSURE GAUGE

and get out of your tires all the miles they can give.

Price in U. S. A. **$1.50**

At your dealer or

A. SCHRADER'S SON, Inc.

783-803 Atlantic Avenue, Brooklyn, N. Y.



ONLY PHILADELPHIA HOTEL

Having Direct Subway and Elevated Connection with All Railroad Stations, Ferries and Department Stores.

NEW BINGHAM

Cor. 11th & Market Streets

European Plan — Philadelphia, Pa.

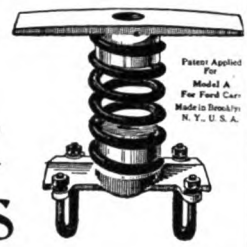


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Mr. Ford-owner! Attention!

USE THIS→ AND PREVENT THIS





FOR - - - $6.50

Can Be Installed in Less Than 20 Minutes by the Average Layman.

PLUNKETT SHOCK ABSORBERS

"A Shock Absorber and Rebound Snubber in One"

When the car is standing still, the shock absorber is in a normal position; therefore, when the car starts it takes the slightest action or greatest concussion. On the rebound motion of the car, as soon as shock absorber spring reaches its normal position, it starts to stretch or pull, thereby positively eliminating the extensive rebound which is so common on Ford cars. Can be installed without changing or altering any of the Ford parts or taking away any of the natural action of the Ford spring.

Price $6.50 each, complete

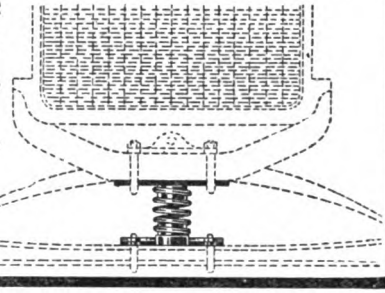
On receipt of check or money order, will ship prepaid to any part of the United States.

For Sale by all Progressive Dealers, Jobbers, Supply Stores and Garages.

Write Us for Particulars

Agency Open—Send for Dealer's Proposition.

PLUNKETT SHOCK ABSORBER CO., Inc.
1323-5-7 Washington St.,
Brooklyn, N. Y.



LITTLE SCRAPS WILL HELP IN THE "BIG SCRAP"

An Ounce of Steel Wasted is a Bullet Mis-Spent

Every pound of steel, the War Industries Board indicates, is now needed for Essential Purposes.

Use every precaution in the distribution of Automotive Springs for repair and replacement.

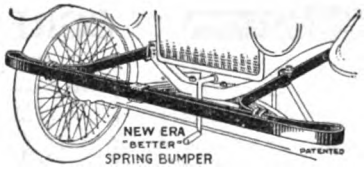
We and our distributors are co-operating fully with the War Industries Board and know it is the desire of every Dealer to do likewise.

Every scrap of steel—big or little—conserved, means a bullet for the Hun and a bomb for freedom.

TUTHILL SPRING CO.
(Established 1880)
760 Polk St., Chicago, Ill.



New Era "Better" Spring Bumpers



Double front bar full length, 1¾ x 5/16 inch spring steel has great resisting power, is light, strong and neat, guaranteed against damage or defective parts.

Made to fit all cars. For sale by first-class dealers everywhere.

NEW ERA SPRING & SPECIALTY COMPANY
1171 Hamilton Avenue, Grand Rapids, Michigan

RUN YOUR FORD ON KEROSENE!

USVCO

FORD OWNERS WHO ARE USING THE

Olsen Kerosene Vaporizer

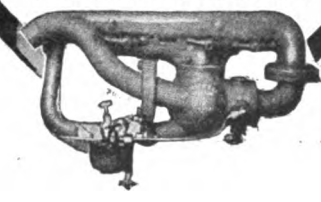
are substituting kerosene for gasoline and getting equal power, more mileage and greater flexibility. The Olsen burns clear kerosene, saves 60 to 70% the cost of gasoline. Engine runs without skipping, stalling or loading up. No smoke, waste or odor. Fits any regular carburetor. No change in engine—no extras.

30-DAY MONEY BACK GUARANTEE

Write for particulars

We are prepared to offer a few dealers a very attractive proposition.

U. S. VAPORIZER COMPANY
213 State Street, Boston, Mass.



Made from Oil-Tempered Spring Steel Wire



They Remove Carbon Where Others Will Not

PATENTED MARCH 26, 1918



Cut out experimenting—get down to business. Why not own a set of FLEXIBLE CARBON SCRAPERS? They are the only scraper on the market that will do a satisfactory job without taking the motor to pieces. Compounds are dangerous. All good mechanics advise scraping carbon. Over 100,000 sets now in use by Auto Mechanics.

Price Per set, $1.50. Ask Your Dealer or Write

Flexible Carbon Scraper Co. 1421 W. Washington St. Los Angeles, California

Send for free sample of The Automobile Dealer and Repairer.
MOTOR VEHICLE PUBLISHING CO.
71-73 Murray Street, New York

Please Mention the Automobile Dealer and Repairer when writing to advertisers.

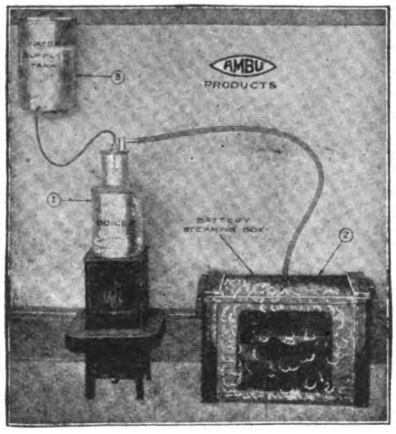
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Fewer Men Can Accomplish More With These Helps.

The more men the army needs and takes—the more mechanical equipment must you put in your battery shop to get out the work. Therefore, NOW is the time you must help your men with these time and labor saving devices. And they are money makers for the shop too.

Ambu Battery Steamer

Softens up the "compound" and enables the men to open the battery in the shortest time with no chance of damaging the box. Many a shop has lost the profits on several jobs by having to replace battery boxes broken in opening. Takes but a few minutes to open any battery. ***Each $25.00***



Ambu Battery Plate Press

Probably one of the most valuable "salvage" devices. By pressing plates properly the life of a battery is doubled and new installations avoided. Made of specially finished wood, acid-resisting. Saves its cost in the time lost in cleaning up the metal vise that has been corroded by acid and water. Produces perfect plates in a short time. ***Each, $32.50***

Ambu Plate Burning Rack

Burning-in new plates in a battery, without the use of a rack, is a long hard job. The AMBU Plate Burning Rack holds every plate in proper place till finished. Saves its cost on first three jobs. ***Each, $7.50***

Lead Molds

Save all the old lead in your shop. Melt it down into usable form in these handy lead moulds. Save their cost in salvaged metal in a few days. Every shop needs a pair and large shops several. ***Each, $1.80. Pair, $3.50***

"The Automobile Storage Battery"

A technical book in non-technical language that tells the theory and actual practice in the care and repair of storage batteries. Should be in the office of every shop for reference. ***Postpaid, $5.00***

Every device listed here has been tested and is in use in the leading shops of the country. We guarantee entire satisfaction or your money back without question.

If your jobber cannot supply you write direct.
Ask for our booklet of Battery Shop Helps.

AMERICAN BUREAU OF ENGINEERING
1025 S. Wabash Ave., CHICAGO
Makers of A M B U Electric Trouble Shooter

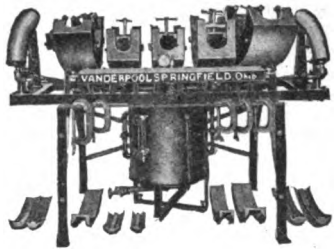
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Get into Automobile Tire Repairing Business. All the work you can do. Our outfit has capacity up to $100 worth of work a day. We supply everything and show you how to start.

Vanderpool Vulcanizer

The only vulcanizer made that repairs tires upon the correct principle exactly as the big factories. Now used by veteran tire repairing men after discarding all other makes. A tremendous opportunity. Write at once for free

Tire Repairing Manual



Remember, **Vanderpool** is the only vulcanizer which operates on correct principle.

In Answering Address Dept. A-2

The Wm. Vanderpool Co., Springfield, Ohio

BUNTING BEARING BRONZE CORED BARS

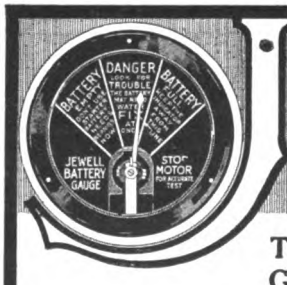
The Standard

REPAIRING and overhauling of old cars is on the increase because new cars are on the decrease. Be ready for more work—more efficient work. Stock up on Cored Bars. Same quality as our finished product.

Ask for Catalog X

THE BUNTING BRASS & BRONZE CO.
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STOCK SIZES				
Piece No.	Outside Diameter	Inside Diameter	Length	Approx. Weight
A	1	½	12	2
B	1¼	½	12	3½
C	1½	¾	12	5
D	1¾	¾	12	7
E	2	1	12	8½
F	2¼	1¼	12	10
G	2½	1¼	12	11½
H	2¾	1¾	12	12¾
I	3	2	12	13¾
J	3¼	2¼	12	15¾
K	3½	2¼	12	17
L	4	3	12	21
M	4¼	3¼	12	20



JEWELL BATTERY GAUGE

The Ever Watchful Guardian of Your Battery.

A Real Necessity to Avoid Battery Trouble.

Owners and Dealers, Write for Details

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Sales Department
Gray-Heath Company
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YOUR PRODUCT will make a splendid

Christmas Gift!

ADVERTISE THAT FACT IN THE

NOVEMBER 1918
CHRISTMAS NUMBER
of the

Automobile Dealer and Repairer

"The Best Little Trade Puller of Them All"

FORMS CLOSE NOV. 6th, 1918

Motor Vehicle Publishing Co.
71-73 Murray Street NEW YORK CITY

When the cold stiffens the motor and the cranking struggle is on, you want to be one of the dealers who let **Flash Starting Fluid** do it for the customer.



"Flash" gets action with the characteristic speed and efficiency of a

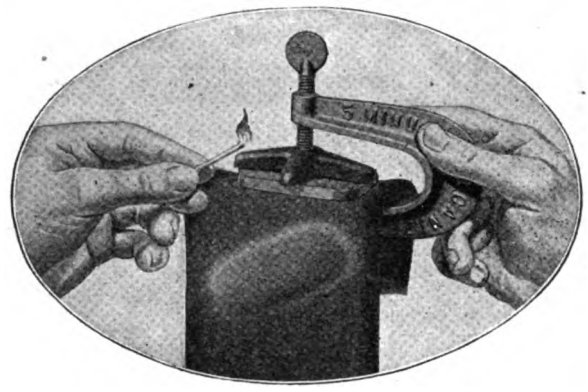
WONDER WORKER

preparation. It is different from anything ever offered before.

No matter how low the temperature, a few drops of **"Flash"** introduced through the pet cocks will start the engine instantly. And it'll start trade your way just as surely.

Ask for catalog and prices of complete WONDER-WORKER line when you write in for quotations on "Flash."

THE HALL-THOMPSON CO.
HARTFORD :: :: CONNECTICUT



A Million Motorists Use It 4,000,000 More Need It

The limited supply and increasing cost of inner tubes makes it necessary for motorists to repair punctures, cuts, tears and cracks—to keep their tubes in good repair

War conditions make it imperative for motorists to stop the easy-going, wasteful habit of carrying $5 to $15 worth of spare tubes—that deteriorate quickly—and scrapping perfectly good inner tubes that merely have a puncture, cut or tear—which can be repaired *permanently* with a Shaler 5-Minute Vulcanizer, quicker than a new tube can be inserted.

Saves Tubes—Saves Repair Bills

You can repair your own tubes—as good as new. It's easy and inexpensive. *The Shaler works automatically*—and without fail. Just touch a match to the non-flaming chemical fuel. In five minutes you have a firm, flat, "feather-edge," permanent repair—stronger than any "stuck on patch"—stronger than the tube itself. No gasoline, cement or flame, and no danger of injuring the tube. Carry it in your tool box for emergency use It works in the wind, in any weather, anywhere The heat is applied directly to the pure gum patch and does not extend to the tube itself.

Complete Outfit Only $1.50

The outfit includes, the Vulcanizer—12 Patch & Heat Units (6 round for punctures, and 6 oblong for cuts)—complete, $1.50. Extra Patch & Heat Units 75 cents per dozen.

Sold By Accessory Dealers and Jobbers

TO DEALERS— To insure shipments—it is advisable to order from your jobber now The great demand has exceeded our factory capacity and shipment will be made according to priority in receipt of orders

Catalog of the Complete Shaler Line of Vulcanizers for Motorists, Repair Shops and Garages mailed on request.

C. A. Shaler Co., 809 Fourth St., Waupun, Wis.
Oldest and Largest Manufacturers of Vulcanizers



Mends Tubes in 5 Minutes

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Stops that Leak thru the Windshield

The McCormick-Allmand Patented Weatherstrip is a necessity for every car, Now is the time it sells like hot cakes. Big profits.

McCORMICK-ALLMAND WEATHERSTRIP
PATENTED

made of rubber for both regular and off-set type (Ford Cars) windshields. Closes space on windshield, making it absolutely water-tight. Fits any space or thickness of glass. Easily put on and off.



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255 ILL 17

"Put the Blame on the Man Behind"

Comer Auto Stop Signal

An *automatic* safety device that operates off the brake rod. If your Dealer does not handle, send in his name or order direct

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616-617 Hippodrome Building
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SAVE ONE-HALF THE COST OF A NEW TOP

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AUTO TOPS, SEAT COVERS, FENDERS, ETC.

BUOB and SCHEU
AUTO TOP SPECIALISTS
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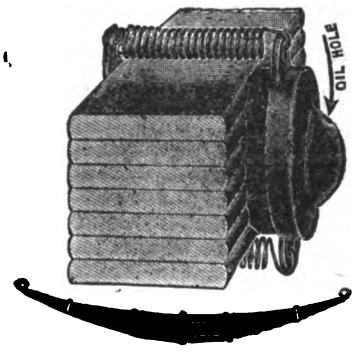
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Are Essential to Easy Riding Springs. RUSTY AND UNYIELDING SPRINGS DO NOT TAKE UP SHOCK.

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Ford Set Complete for $1 00
Same Size Fits All Cars
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"Red Devil" Chain Drills

Fast Sellers Good Profits

The demand for "Red Devil" Chain Drills is growing daily.

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They have an automatic feed adjustable to any pressure. Friction is minimized by hardened tool-steel ball bearings and races. Polished steel chain. Heavily nickel-plated Universal chuck holds round or square shank drills and bits 3/16" to 3/8"; alligator jaws of forged tool-steel.



Unconditionally guaranteed against defects in workmanship and to give absolute satisfaction.

If you are not already selling them, write at once for our proposition.

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55,967	Auto Supplies, Retail, U. S.	3.00 per M.
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404	Auto Manufacturers	3.00 per M.
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CUTS FUEL BILLS 1/8. **GIVES 20% MORE POWER.**

1/8 MORE MILEAGE. **ELIMINATES CARBON.**

GIVES QUICKER AND EASIER STARTING WITH CONSEQUENT BATTERY SAVING.

GIVES SNAPPY PICK-UP AND PERFECT RUNNING MOTOR.

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Send for full size package to-day, enough to energize 100 gal. of gasoline. **50 cents, postpaid.**

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Send us your order for 1 doz. boxes of Standard Motor-Pep at $4.00 ($2.00 profit to you) and we will send you

ABSOLUTELY FREE

50 Samples, 50 Testimonial Circulars, 1 Display Card

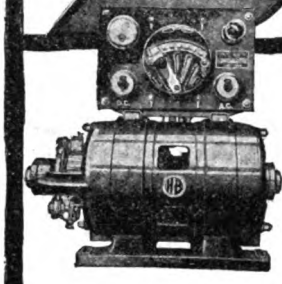
SEND YOUR ORDER TO-DAY, and cash in on some of this profitable and repeat business.

THE UTILITIES CO.

310 Citizens Bldg. Cleveland, O.

Now and After the War

BATTERY CHARGING Will Pay You BIG PROFITS



CURTAILMENT of motor car production - more old cars in use—more batteries to charge—and battery charging means bigger business and bigger profits—that's the opportunity you have right now. After the war, the demand will be vastly increased and your opportunities will be greater than ever.

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Go after this profitable business now and build for after the war with HB equipment. Anyone can operate—no extra help necessary. This 500 Watt Charger will recharge from 1 to 7 batteries at once, with a current cost of only 12c to 15c per battery. Autoist pays 75c to $1.50. Hundreds of HB owners are clearing $100 to $150—some even more. Why not **you**?

$15 Puts This Money-Maker in Your Garage

Balance in 9 monthly payments of $20 each. Earnings should easily pay and make good profit besides. Write for full particulars or send $15 with trial order and get your charger at once. Under absolute money-back guarantee, you run no risk. Write or wire today.

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BOX D-10, TROY, OHIO

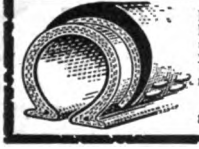
GET ANOTHER 5000 MILES OUT OF YOUR OLD TIRES

Stop throwing away your money!

Save your old tires; for they mean dollars and cents to you. It makes no difference whether they are sand blistered, punctured, rim cut or blown out, **McDaniel will put them back on the job.**

Simply send your old tires **prepaid** to the address below, with your name and address attached. When the tires are received at the McDaniel plant they are carefully examined by experts and all necessary repairs are made. The better cover is telescoped over the other one, then the bead is cut from the outer tire and both are firmly locked together by the SPECIAL McDANIEL DOUBLE TREAD PROCESS. Your old tires are now made into one good tire ready to give you thousands of miles extra service.

SIZE	If You furnish 2 Casings	If You furnish 1 Casing	If I furnish Both Casings	Special Gray Tubes
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30x3½	4.00	6.00	7.25	2.40
32x3½	4.25	7.25	9.00	2.55
31x4	4.50	7.75	9.50	3.10
32x4	4.75	8.00	10.00	3.20
33x4	5.25	8.25	10.25	3.30
34x4	5.50	8.50	10.50	3.40
36x4	5.75	8.75	11.00	3.50
34x4½	5.75	9.00	11.50	4.10
35x4½	5.75	9.25	12.00	4.25
36x4½	6.00	9.50	12.50	4.35
35x5	6.25	10.50	13.50	5.00
37x5	6.50	11.50	15.00	5.40

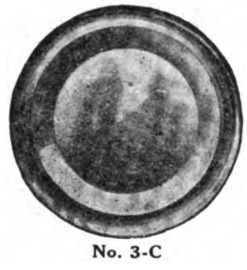


DO IT NOW—Send us your worn out tires by prepaid express today and save this extra money.

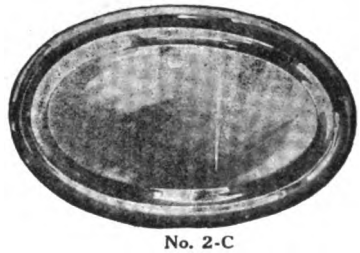
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804 Commercial Ave., CAIRO, ILL.

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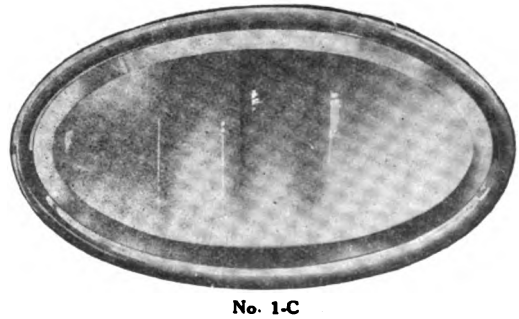
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No. 1-C

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All screws banished.

Frames of very unique construction—simply snap together.

This grips the curtain material evenly and securely, making it impossible to sag and wrinkle.

It also makes a water-tight job.

A cutting pattern is furnished with each light, so that all trouble for trimmers is removed.

CLASSIC CURTAIN LIGHTS are shipped with glass permanently secured in the outside frame, thus eliminating all glass breakage in setting.

Standard "CLASSIC" finish is American nickel silver.

We are prepared to make prompt deliveries.

We make these lights in three sizes only, namely:

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No. 3—C, 6 in. round

Joseph N. Smith & Co.

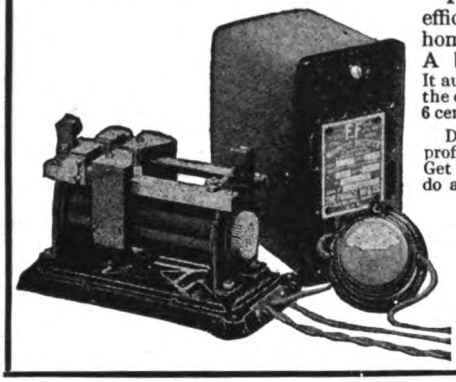
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F. F. BATTERY BOOSTER



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Dealers will find this a profitable selling proposition. Get our Bulletin No. 10, and do a little missionary work. Satisfied customers will be **Boosters**. Dealers' discount on request.

Also D. C. Battery Boosters

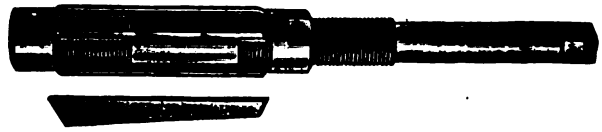
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Cleveland, Ohio

The best made for repair work

The Critchley Expanding Reamer

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Try One and You Will Want More.



Reams odd size holes

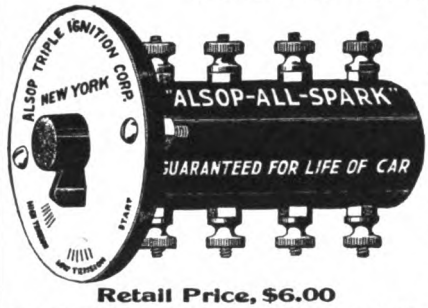
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"ALSOP-ALL-SPARK"

Ordered by War Department



Gives Two-Plug Ignition if desired
Saves Fuel and Spark Plugs
Gives More Speed and Power
Sparks Carbon-Choked Plugs
Causes Perfect Combustion
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Prevents running engine with a misfire and the delays from changing spark plugs on trips.

BY SIMPLY TURNING A DIAL ON DASH

Dealers, write for a real sales proposition

Retail Price, $6.00

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SAVE GASOLINE

with PRESSURE PROOF Piston Rings



THEY will cut down the amount of gasoline and oil you normally use—keep your motor free from carbon—give it added power and keep it at top-notch efficiency. One Pressure Proof 3-part ring or two Pressure Proof 2-part rings is a full piston equipment.

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Combination MANIFOLD For Ford Cars

saves gasoline and makes cold weather starting easier. It combines intake and exhaust so that exhaust heat dries incoming gasoline and vaporizes it perfectly. Result: Smoother running, more power, more miles per gallon, less carbon. Price $9.00; West of Rockies $10.00; in Canada $12.50.

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SPRINGS IN STOCK FOR ALL CARS

90,000 Springs. 588 Types.

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STENMAN ELECTRIC VALVE GRINDER

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Prove the quality of the
Buell Explosion Whistle

No other warning signal approaches it in efficiency, durability or salability. Write for our special dealer offer showing how *cash profits* come to all Buell dealers.

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WILL MAKE YOUR AUTOMOBILE JUST LIKE NEW

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Is the "Standard" Ford Ignition Lock. Always demand the Defender and take no imitations. The Defender safely locks the coil box, and is the only lock that grounds the electrical system; this makes them thief proof. Insurance Companies require the Defender and allow 15% off on Insurance.

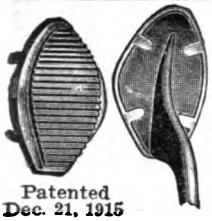
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DETROIT, MICHIGAN

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TO YOUR OLD CAR AND MAKE IT LOOK NEW.
Price $9.00 to $20.00. Parcels Post Paid.
You Save ⅓ price of a new Top, and can apply it yourself. Why sacrifice your old car? Many are better than the new ones. Get our catalogue. It's a money saver.
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Patented
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"PERFECTION"
Pedal Pads
FOR EVERY MAKE OF CAR
Clamped on in less than one minute. No bolts, or drilling of holes in pedal necessary.
Send for free printed matter.
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Cox "Splash-Pan" Type
BUMPERS
For Chalmers, Hupmobile, White, Mitchell, Oldsmobile, Studebaker, and the constantly increasing number of other cars with splash pan extended to the end of frame.
Write for prices on the whole line.
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Remade Bearings
They are Right—therefore they are Best
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Pocket edition booklet of valuable information to owners, chauffeurs, garage proprietors and their help. Free to those who write for it.
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NEWARK CHICAGO

TIRE-DOH
Thousands of dealers recommend it for repairing punctures, blowouts and inner tube tears—it will fix torn-out valve stems and do other difficult jobs—without the need of heat or tools.
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ATLAS AUTO SUPPLY CO., 616 W. Austin Ave., Chicago, Ill.

KENNEDY AUTO STORAGE COVERS
Furnish efficient and economical protection for cars in dead storage. They are made of heavy, durable paper, in standard sizes to fit any cars.
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J&B Gasoline Injectors and Timers for Fords
65 EAGLE STREET
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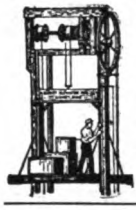


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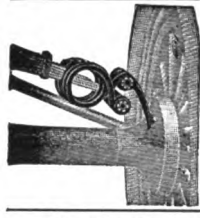
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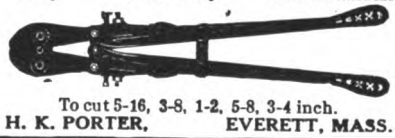
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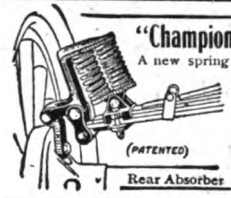
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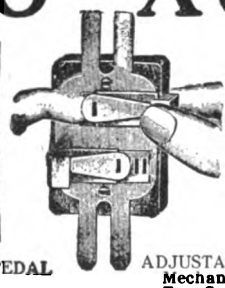
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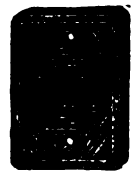
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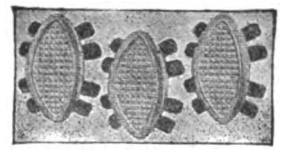


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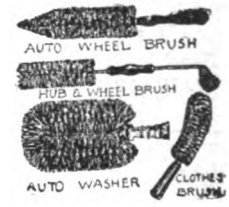




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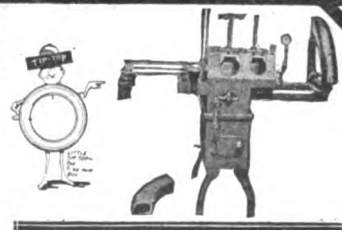
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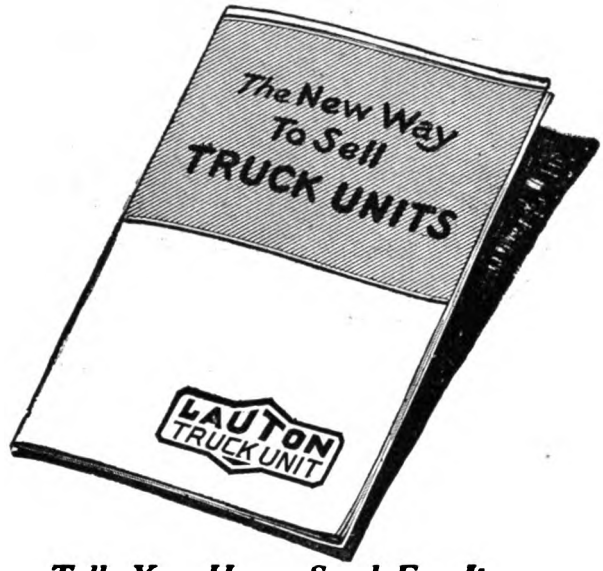
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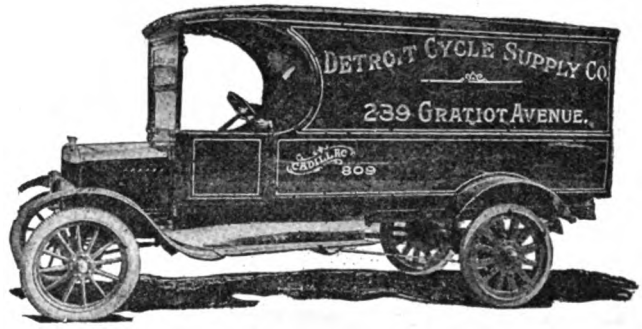
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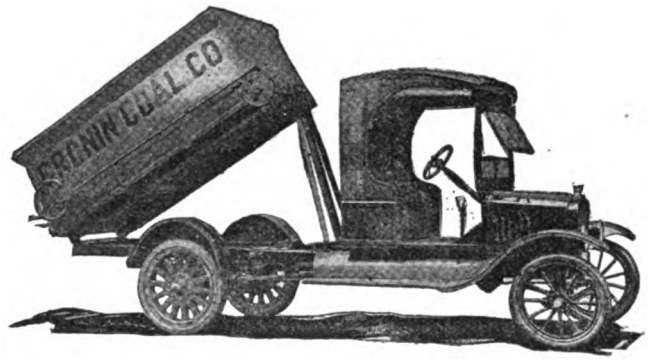
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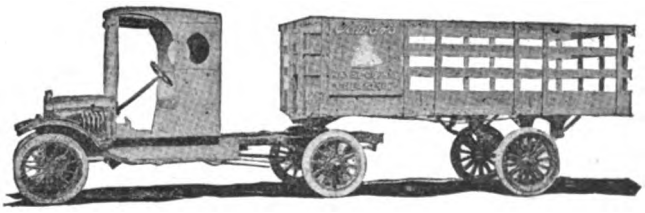
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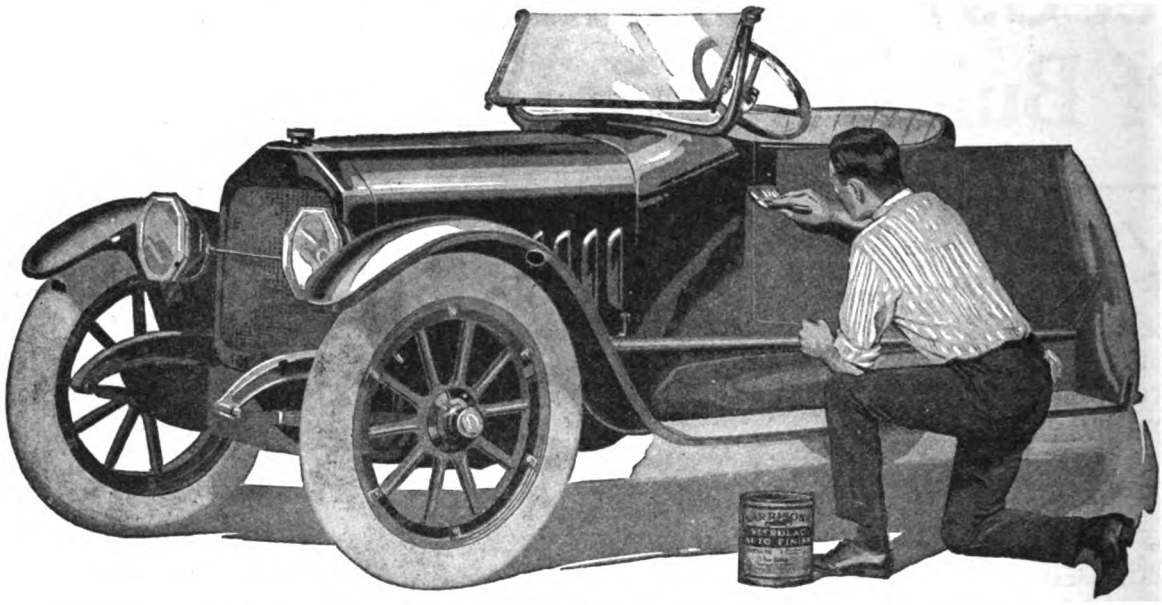






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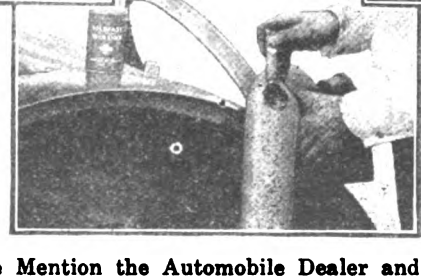
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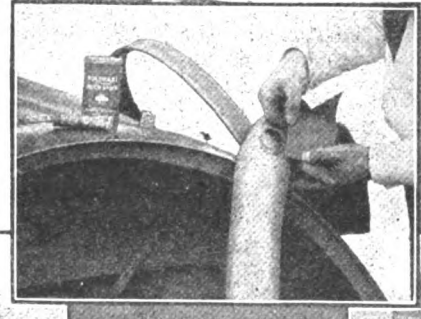
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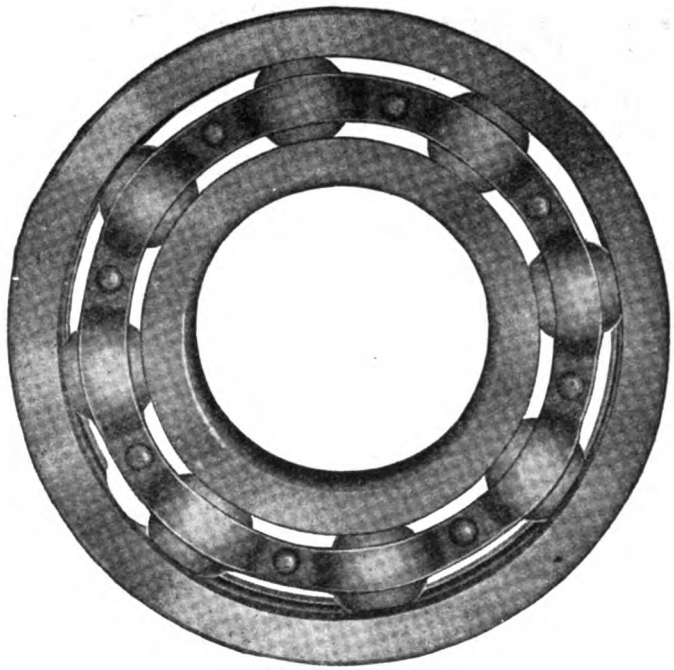
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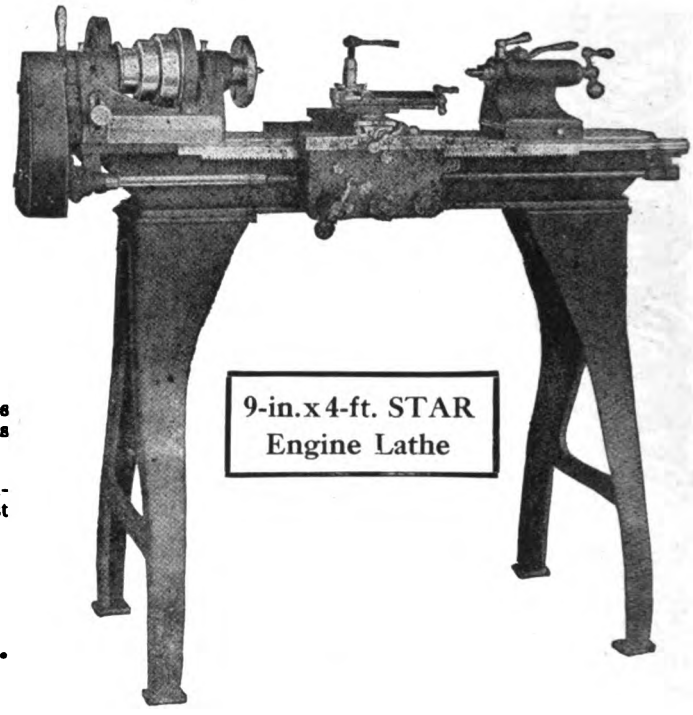
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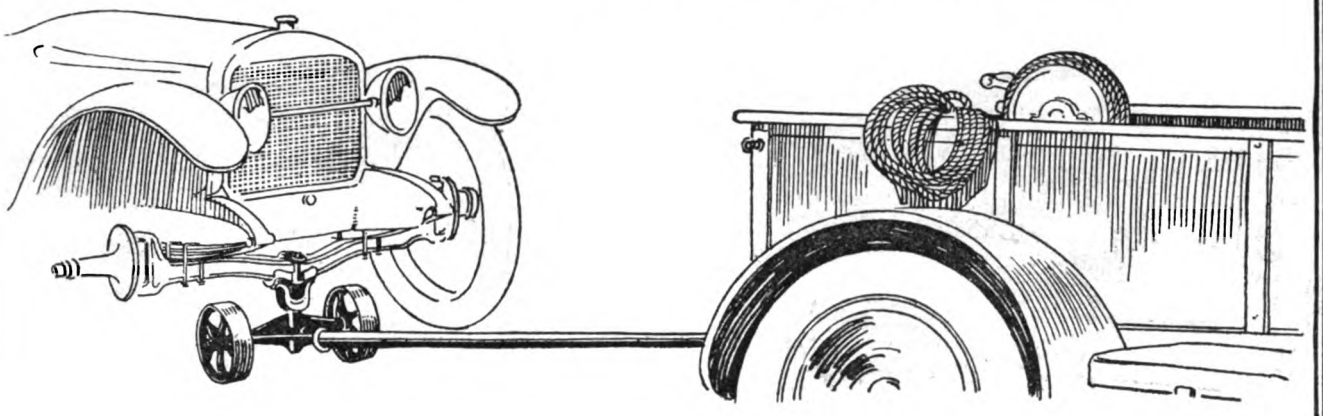
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As a matter of fact, the Weaver Auto Ambulance should be included in the equipment of any well ordered, progressive garage. It is an essential to garage efficiency of the kind that builds up new business and holds old business.

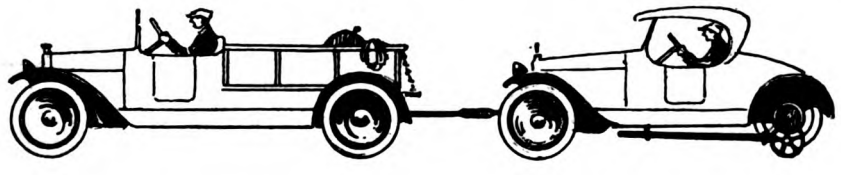
The Weaver Auto Ambulance advertises the fact that the garage is equipped to handle repair work in a highly efficient, quick manner. It indicates the ability of a garage to handle the trade and handle it right.

WEAVER GARAGE EQUIPMENT

It's easy to operate, it's never out of order and it's always ready at any time. It's a time saver and a money maker for any garage.

Write for a catalog today—it's *free*.

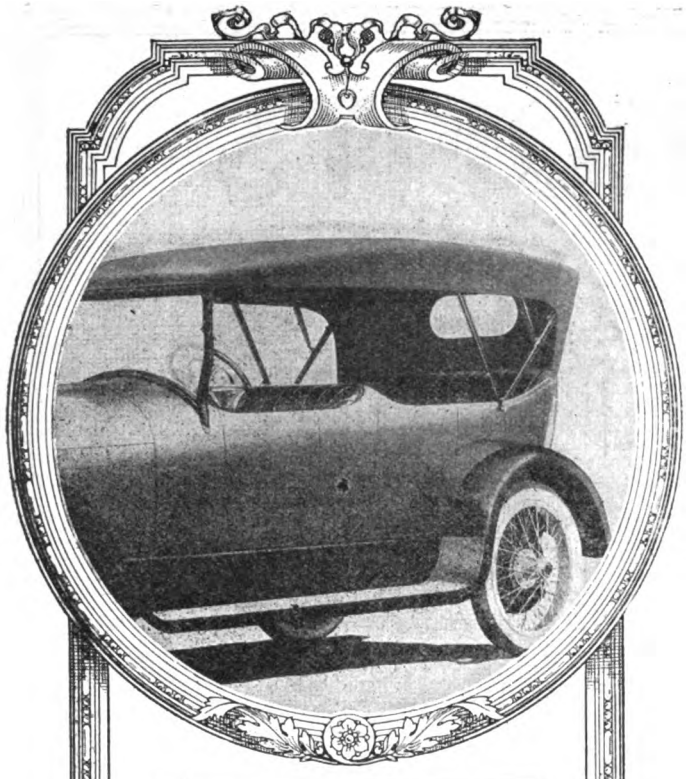
WEAVER MANUFACTURING CO.
2175-79 S. NINTH STREET, SPRINGFIELD, ILLLINOIS





WEAVER TOWING POLE

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"Defies Time and the Elements"

CHASE

DREDNAUT

Motor Topping

RE-TOPPING DAYS

NEVER before was retopping so popular—Motorists everywhere are economizing and repairing their old cars.

For real beauty in top materials, for real worth throughout, we have Chase Drednaut Motor Topping—a waterproof, sturdy fabric backed by the "Chase" trademark.

Don't experiment with mere top materials—get Chase Drednaut and and make sure.

It will make friends every time.

Write us your requirements, and samples will be sent at once.

L. C. CHASE & CO., BOSTON

NEW YORK DETROIT CHICAGO SAN FRANCISCO

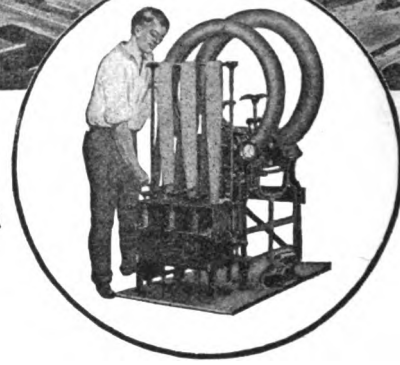
Leaders in Manufacturing Since 1847

CHASE

Used by over 100 Leading Tire Factories



Largest Profits in



Tire Repairing

are made only through the use of the most approved and up-to-date equipment—outfits that are used, recommended and sold by all of the leading tire companies—

Akron-Williams

TIRE REPAIR EQUIPMENT

We are the oldest and largest makers of tire building and repairing equipment; our location in the very center of the tire building industry enables us to keep constantly in touch with all the latest developments in tire and tube repairing; and every piece of our equipment is designed and perfected in co-operation with the foremost tire engineers, to do the most efficient work in the shortest time.

A Steady and Increasing Business.

The Government is cutting down on tire production; a scarcity of new tires is threatened; motorists must have their tires repaired over and over again; the tire repair business is getting better and better; it goes on all the year 'round—and it pays *3 times the margin of profit on new tires.*

DEALERS: Get into this profitable and growing business as a department of your present store or shop. But start right—with an Akron-Williams outfit. *Send today for catalog.*

THE WILLIAMS FOUNDRY & MACHINE CO.,
Glendale St., Akron, Ohio.

Exclusive Distributors for California: The Waterhouse and Lester Company, San Francisco, Oakland and Los Angeles.

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"NORMA"

"NORMA" PRECISION BALL BEARINGS

(PATENTED)

The ultimate measure of a car or truck is in the strength of its weakest—not its strongest feature. Appearance may deceive, but performance will surely reveal the integrity—or otherwise—of the design, construction and equipment. Let your scrutiny of service qualities extend to every detail of every accessory.

There is a distinguishing mark by which magnetos and lighting generators which deserve your unqualified confidence may be identified. That is the presence of "NORMA" Ball Bearings—the standard bearings adopted by apparatus builders to maintain the high quality of their own product.

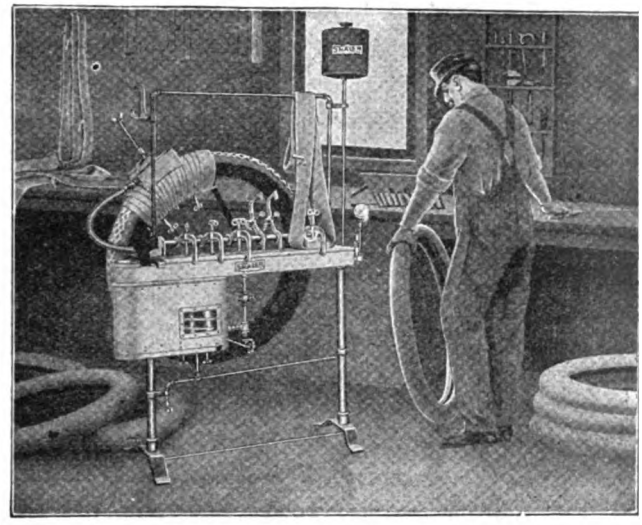
Be Sure—See that Your Electrical Apparatus Is "NORMA" Equipped

THE NORMA COMPANY OF AMERICA

1790 BROADWAY NEW YORK

Ball, Roller, Thrust and Combination Bearings.

"NORMA"



Make Money Now Repairing Tires

The increasing cost, and limited supply of tires makes it necessary for motorists to conserve their casings and tubes—to get the maximum mileage Present conditions offer tire repair men a big opportunity to make money—and help win the war Experienced help is not necessary. A boy can learn how to make perfect tire repairs in 30 minutes. Every car owner in your town is a possible customer. Jobs are plentiful because tires blow out and puncture every day. Motorists are willing to pay liberal prices for repairing punctures, blow-outs, cuts, tears, rim cracks, etc.

SHALER

SHOP VULCANIZER

Is the Only One That Has

Automatic Heat Control

Will do as much and as perfect work as the large, expensive vulcanizing outfits which cost from $250 to $500. The price of this Complete Steam Vulcanizing Plant—heated with either gas or gasoline—is remarkably low—$70 subject to Trade Discounts. Outfit shown above is Type N. P. R.—No. 41—other models heated by steam or electricity are described in our catalog.

It is portable—easily moved to any part of the shop—occupies but little floor space—a boy can operate it easily, and make perfect repairs The Shaler Patented System of Automatic Heat Control regulates it automatically. It must vulcanize just right. Can't overcure or undercure, and requires no watching or regulating Large capacity. Repairs 12 casings and 200 tubes a day. Handles any style or size of tube or casing.

The Shaler Wrapped Tread Method of tire repairing is used by all tire manufacturers. It mends casings and tubes quicker, better and at less cost. We furnish Complete Instructions with each outfit. So simple that anyone can do perfect work.

Ask Your Jobber—or Write for Catalog

of the Complete Line of Shaler Vulcanizers for Repair Shops, Garages and motorists' use.

C. A. Shaler Company

812 Fourth Street Waupun, Wis., U. S. A.

(Oldest and Largest Manufacturers of Vulcanizers)

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Uncle Sam's Orders

"No more new cars" means that you must double your efforts to maintain the efficiency of cars now in use. Standardize your repair shop with GTD taps and dies. Here is an indispensable "first aid" outfit, the

Little Giant Combination Screw Plate

containing both U. S. Standard and S. A. E. Standard.

No need of having a separate outfit for each thread standard. "Little Giant" is the name that for over forty years has designated quality in screw plates—it carries the GTD guarantee.

Nothing less than the best in Repair Shop Equipment is permissible during the war.

GREENFIELD TAP & DIE CORPORATION, Greenfield, Massachusetts.

New York, 28 Warren St. Chicago, 13 So. Clinton St. Detroit Office, 74 Congress St. W.

Canadian plant, Wells Brothers Company of Canada, Ltd., Galt, Ontario.

S-M-C

Trade Mark Registered U. S. Pat. Office

ASBESTOS BRAKE LINING

meets every emergency—is everlastingly durable. Will not burn, glaze or crumble.

When automobiles were simply considered pleasure cars any old brake lining might do—provided the car owner was willing to risk his life and his car.

But now, when every car should be on the road every day to relieve congested transportation facilities—the use of dependable **S-M-C** becomes a patriotic duty.

See the S-M-C *on every roll of brake lining. Its use means* **Safety Made Certain.**

Made in rolls of all widths up to 6 inches.

Staybestos Mfg. Co., 5541 Lena St., Philadelphia, Pa.

I want your quantity prices on S-M-C Brake Lining and Universal Transmission Lining—particularly on your $1.25 FORD Set.

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Address.....

City.....

State.....

UNIVERSAL

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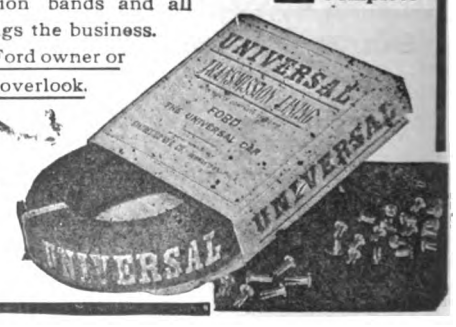
TRANSMISSION LINING

A wonderfully efficient cotton lining made by the makers of S-M-C Brake Lining. Compactly woven like S-M-C, treated with a perfected compound—which makes it water-proof and oil-proof. Absolutely chatterless. As quick as it is quiet.

This Handy Set For FORDS

$1.25 Complete

—complete with three proper lengths for Ford transmission bands and all rivets required, brings the business. An opportunity no Ford owner or dealer can afford to overlook.



STAYBESTOS MFG. CO.

5541 Lena Street, Philadelphia

The "Modern Factory" equipped to make all types of brake lining and all widths up to 6 inches

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"YANKEE" TOOLS

Multiply Man's Power

The service man —he knows what it means to have tools that'll handle any and every emergency job — and handle it quickly. When he's miles from the shop, and up against an unusually difficult problem, — there's his "YANKEE" Ratchet Breast Drill, ready to drill holes in nooks and corners where ordinary drilling tools won't work at all.



It has two speeds; and five adjustments: (1) Plain Drill, (2) Left-hand Ratchet, (3) Right-hand Ratchet, (4) DOUBLE Ratchet (drill cuts on both forward and backward movements of crank), and (5) Gears Locked.

Speed and Ratchet Adjustments changed at a finger touch and without removing drill from work.

Speed Shifter at hub of crank; Ratchet Adjustment shown between bevel gears.

"YANKEE" Ratchet Breast Drill

PRICE $8.35

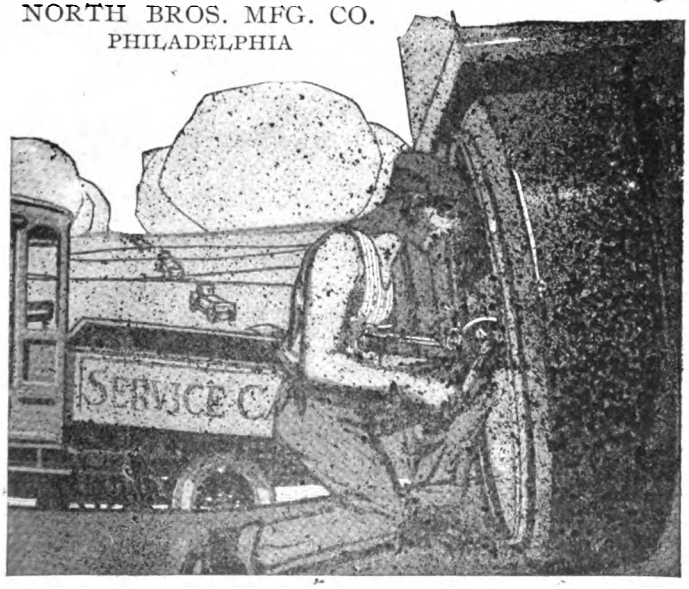
No. 1555. Length 17 in. Three-jaw chuck for round shank drills up to ½ in. diameter.

No. 555. Length 17½ in. Two-jaw chuck for holding both rounds and squares.

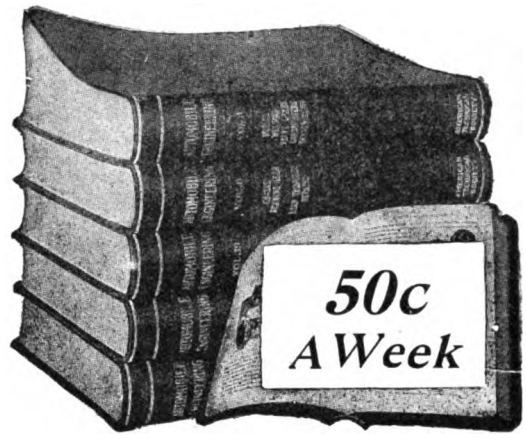
YOUR DEALER CAN SUPPLY YOU

Let him show you the many working conditions to which this time- and labor-saving—power-multiplying!—"YANKEE" tool can be adapted. And there are other "YANKEE" Tools the motor mechanic needs. Write us for free "'YANKEE' Tool Book" illustrating and describing them.

NORTH BROS. MFG. CO.
PHILADELPHIA



Auto Books



Just Out

The NEW 1918 EDITION of **Automobile Engineering** answers 10,000 questions on the construction and repair of all types of pleasure and commercial cars, including 1918 models. Two entire volumes are devoted to the various ignition, starting and lighting systems, and hundreds of wiring diagrams have been added. Welding, vulcanizing and public garage operation are thoroughly covered. Five thick volumes, 5¾ by 8¼ inches, flexibly bound in half morrocco or flexible bindings, gold stamped. 2,500 pages, 2,100 illustrations, diagrams, etc., that make difficult points as simple as A-B-C. Written in plain, every-day language. Concise and to the point.

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Help Win the War
BY STEADY WORK
FULL TIME
SIX DAYS A WEEK
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In addition to the books you get free of all charge a $12.00 Consulting Membership. If any question puzzles you—write us. Our corps of auto experts will solve any auto problem. Ask all the questions you want for a whole year. This service is absolutely free.

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See these books before you decide to buy. Remember—don't send us a penny. Just fill in and mail the coupon. This offer is open to any person living within the boundaries of the U. S. and Canada.

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Please send me a set of **Automobile Engineering** for 7 days' free examination, shipping charges collect. If I decide to buy, will send $2 in 7 seven days and balance $2 a month until $17 80 has been paid, when books and Consulting Membership will be mine. Otherwise will notify you to send for them at your expense.

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THE Fisher PATENTED "RIM-GRIP" SUB-CASING

MORE MILES PER TIRE

LESS TIRES TO BUY

The Blows That Your Tires Receive, When You Strike Objects in the Road, Leave Weakened Places in the Fabric

A TIRE IS AS STRONG AS ITS WEAKEST POINT

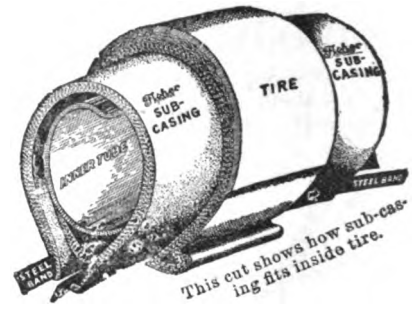
The weakened places are hard to detect now, but will result in blow-outs later.

RIM-GRIP SUB-CASINGS reinforce the fabric of the tire at all points from bead to bead. They make a partially worn tire stronger than it ever was. It can be worn out completely and the sub-casing used in another tire. As the cost of equipping a car with new tires is much greater than last year, it will pay you to investigate Rim-Grip Sub-Casings.

Write for Particulars

FISHER MANUFACTURING CO.

1706 Payne Avenue **Cleveland, Ohio**



This cut shows how sub-casing fits inside tire.

20th CENTURY'S No. 6 SELF-VULCANIZING PATCH



This new idea in Patch construction eliminates every possibility of an imperfect tube repair—and the man who looks at an idea to see if he can use it, and not to see if he can get along without it, is the man who wins out every time.

This Patch is Guaranteed Not to Loosen, Leak, Creep or Blow Out. Absolute Satisfaction or Money Refunded

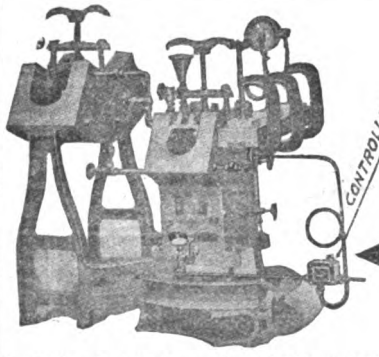
MADE IN 3 SIZES

2¼x16—36 Square Inches, 50 Cents 4x15—60 Square Inches, 75 Cents
6½x20—130 Square Inches, $1.50

If not found with your JOBBER or DEALER, write to us direct.

20th CENTURY TIRE PROTECTOR CO., MIDLOTHIAN, TEXAS

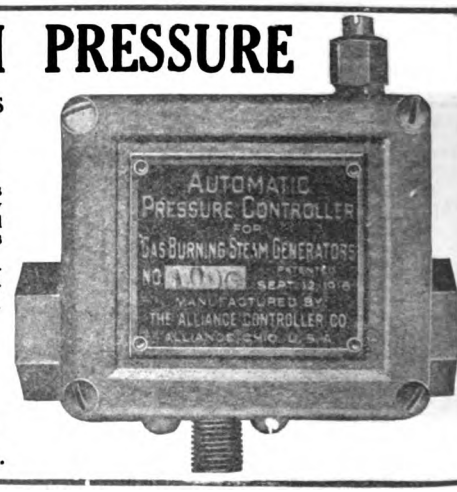
AUTOMATIC CONTROL OF STEAM PRESSURE



FOR ALL GAS-BURNING VULCANIZING MACHINES

THE ALLIANCE CONTROLLER

automatically regulates the gas consumption and holds steam pressure at the desired point. It allows a full flow of gas to the burner to bring the steam up to the desired point quickly, and then automatically regulates the gas to the exact quantity needed to hold that pressure. The Controller is easily adjusted and needs no further attention. Simply light your burner and forget it. Your steam will always stay at the pressure you want to carry.



Complete Instructions with Each Controller. $7.50 Each
Send Money Order Now and Begin to Save

THE ALLIANCE CONTROLLER CO.

Controller Installed on Akron-Williams Mold Main Street, ALLIANCE, OHIO, U. S. A.

TIRE-DOH

Thousands of dealers recommend it for repairing punctures, blowouts and inner tube tears—it will fix torn-out valve stems and do other difficult jobs—without the need of heat or tools.

See Your Dealer, or Write Us.

ATLAS AUTO SUPPLY CO., 616 W. Austin Ave., Chicago, Ill.

CLEAN YOUR ENGINE REGULARLY WITH A



One qt. kerosene and 6 lbs. air pressure cleans all dirt, grit and grease from engine. Prevents wear, actually saves half the usual repairs. Quick, economical, thorough, easy and cleanly to operate. Necessity for repair shops.

Wagner Specialty Co., 1962 Broadway, New York City

GASOLINE COUPON BOOKS

AUTO SUPPLIES COUPON BOOKS

INEXPENSIVE. F. O. B. DESTINATION. SAMPLES FREE.

WE HAVE SOLD MILLIONS OF OUR COUPON BOOKS!

J. P. FORBES, FORBES BLDG., COSHOCTON, O.

Subscribe to the Automobile Dealer and Repairer, $1.00 Per Year

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Show the customer how to shut out the Winter rains from the holes burned, worn or torn in Mohair Tops; take care of him with

WONDER WORKER

MOHAIR TOP PATCHES

A couple minutes' work makes a permanent repair, water and weather-proof, unaffected by the sun; unnoticed because it matches the mohair.

How many other WONDER-WORKER Specialties hold out good Winter profits for you? Write for the catalogue of the 47—and see!

THE HALL - THOMPSON CO.
HARTFORD **CONNECTICUT**

Plugs that Meet Today's Requirements



Conditions of today demand that medium priced spark plugs of KNOWN reliability, only, be used. You make certain of that dependability and economy with



REFLEX SPARK PLUGS

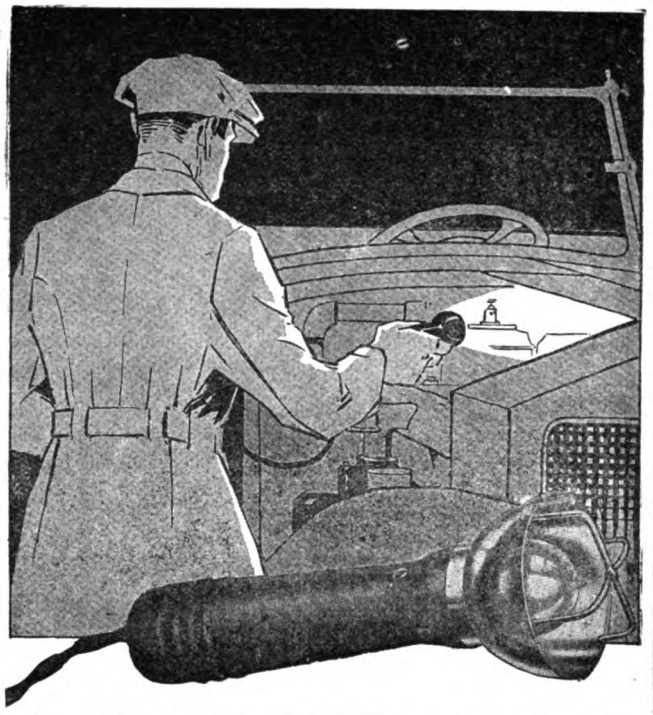


Reflex Spark Plugs are giving dependable service in EVERY kind of work. Their real ruggedness, though, is proved by unusual service in Emergency Mine Rescue Truck use, and in Battle Vans doing war zone work.

Reflex equipped White Truck fitted for Mine Rescue Work where absolute dependability is demanded.

DEALERS: Write us today about the exceptional profit they give you. Learn about the complete Reflex line and the exceptional sales opportunities you are offered in your territory if it is still open.

THE REFLEX IGNITION COMPANY
1711 Payne Avenue, **CLEVELAND, U. S. A.**



A FRIEND IN NEED

Everybody Needs a Trouble Light

It is as much a part of a car's tool equipment as a pair of pliers or a wrench.

Let engine trouble, tire trouble or any unforeseen mishap occur while driving at night, and a good Trouble Lamp is a real friend in need.

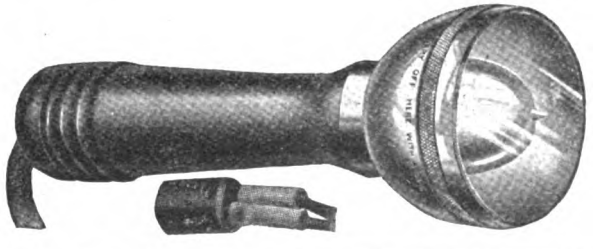
The Connecticut R W Trouble Lamp illustrated above is made up in a neat, substantial manner with a solid brass reflector, heavily nickeled and highly polished. A wire guard, so arranged that it can be collapsed for the removal or insertion of a lamp, protects the bulb against accident.

This lamp is fitted with a rubberoid handle and ten feet of black rubber covered Duplex cord, complete with attachment for plugging into lamp socket on dash.

The Connecticut R G Trouble Lamp is similar to the R W except that the bulb is protected by a high grade lens, which makes it, without doubt, the finest trouble lamp on the market.

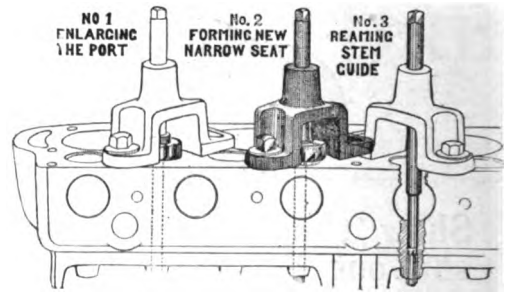
Both the R W and R G Trouble lamps are made with plugs for one or two wire sockets and each is packed in a tubular case with screw cover—the R W without the bulb—the R G with a six-volt, 4 C. P. light.

CONNECTICUT TELEPHONE & ELECTRIC COMPANY
MERIDEN, **CONN.**



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STORM MOTOR REPAIR EQUIPMENT

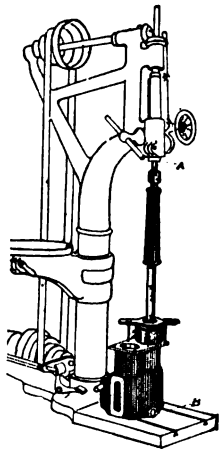


Storm Valve Port Renewing Tool

Renews the valve system complete. Enlarges the port, makes a new narrow seat and a new true stem guide, each with extreme accuracy.

Make Your Repair Job Complete

Rebore the cylinders, renew the valve system, true up the connecting rods and bearings. This kind of work not only pays you better in actual profits but it builds up a reputation for your shop for future business.



The day of the **Used Car** is here—make the most of it. They must be rebuilt to give better service.

The entire Storm line of Tools are designed to increase efficiency, add profits, and save labor. It will pay you to investigate.

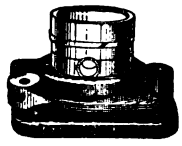
We manufacture The Storm Reboring Machines in varied capacities. They are inexpensive, practical machines that can be handled by unskilled mechanics with accuracy and speed. For hand or power.

We make profit producing, time- and trouble-saving shop equipment, and maintain an extensive piston service. We furnish any piston for any make of motor in any oversize.

Sold by Leading Jobbers Everywhere **Write for Complete Catalog**

STORM MFG CO.

Dept. A-26 THOMPSON, IOWA



The Storm Connecting Rod Bearing Reamer, Jig and Straightening Gauge

A Most Valuable Tool

Just what you have been looking for! Makes accurate fitting bearings and insures perfect alignment With it, your cheapest man can do expert bearing work. It will pay big in time and trouble saved.



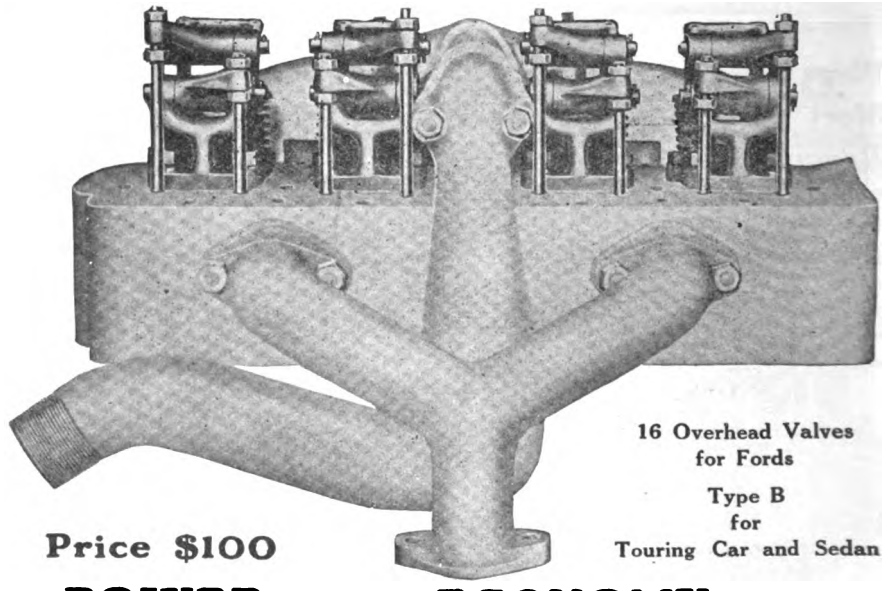
Storm Piston Vise



For greater speed and convenience on Ford piston work. Holds the pistons firmly while repairing or replacing bushings, pins, rings and rods Saves time and prevents damage.

Make Your Ford a $3,000 Car from the Standpoint of Motor Service.

Intake side type B, the latest Roof 16 valve design for Ford touring cars. Exhaust and manifold operate on same side. Note how intake is heated by exhaust manifold, both manifolds being in contact with each other at the division point on the intake, giving all the advantage of hot spot manifolds. Note the simplicity of the design, how easy it can be installed, and that threaded end of exhaust manifold can be connected with regular Ford exhaust pipe.



16 Overhead Valves for Fords

Type B for Touring Car and Sedan

Price $100

SPEED POWER ECONOMY

Speed to climb the steepest hills as you never dreamed of before. Power to double the value of your converted Ford truck, the load carrying capacity of which is only limited to the strength of the rear axle. Speed for the road or for the track to rival the high cost racing cars. A long list of racing car drivers, winners of speed contests, show what you can look for if you want a snappy speedster or a race track winner. Special equipment for touring car, truck and racing car for $100.00. Extra racing equipment at special low prices. Get our quotations on high speed cam shaft, gray iron pistons, aluminite connecting rods, Lynite pistons and rings complete, counter-balances for crank shaft, nickel steel racing gears 3 to 1 ratio, special oiling systems, fast carburetors and beautifully designed racing bodies. Every Ford owner a likely prospect and every Ford converted truck owner a sure sale. An absolute necessity to every owner of a fast Ford.

DEALERS: Get our distributing terms and quotations on the greatest selling specialty in America. Write today.

LAUREL MOTORS CORPORATION, ANDERSON, INDIANA

Made in the "Puncture Proof" City

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Install a Curtis Air Compressor

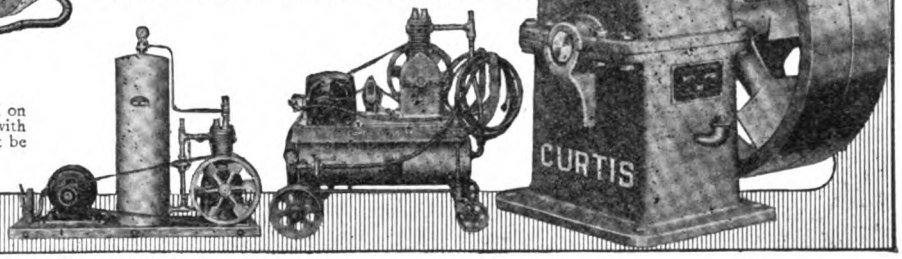


Display a CURTIS "FREE AIR" SIGN above your door—it inspires confidence and will help build your business. Motorists are looking for this familiar CURTIS slogan—because they know oil rots tires—and that a CURTIS Air Compressor furnishes AIR FREE FROM OIL, which means fewer blowouts, greater tire mileage and less repairs. The CURTIS is the ONLY Garage Air Compressor with the controlled splash oiling system that eliminates all danger of forcing oil into the air line.

CURTIS AIR
FREE FROM OIL

Investigate the many exclusive features of CURTIS Garage Air Compressors. The line is complete—five sizes—stationary or portable. Just write your name and address on the margin of this advertisement—tear it out and send it to your jobber, or to us direct, for complete information and prices.

Curtis Pneumatic Machinery Co.
1530 Kienlen Ave., St. Louis, Mo.
Branch Office—530-E Hudson Terminal, New York City



The Curtis Sign

Illustrated above—is 10x14 inches—baked enamel on steel. Cannot be bought, but is furnished FREE with every CURTIS Garage Air Compressor—and cannot be had in any other way.

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A ONE-PIECE PISTON RING

GILL PISTON RINGS are self fitting, ONE-Piece rings of sturdy construction. They have a distinctive joint which absolutely prevents the escape of compression, the formation of excessive carbon, or the pumping of oil into the combustion chamber.

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Make Your Old Top Look Like New

Many a fine-looking top is simply an old one refinished with

"F-S" "Evernew" Auto-Top Dressing

It is easily applied and dries quickly. Makes the top pliable and waterproof.

Write for prices

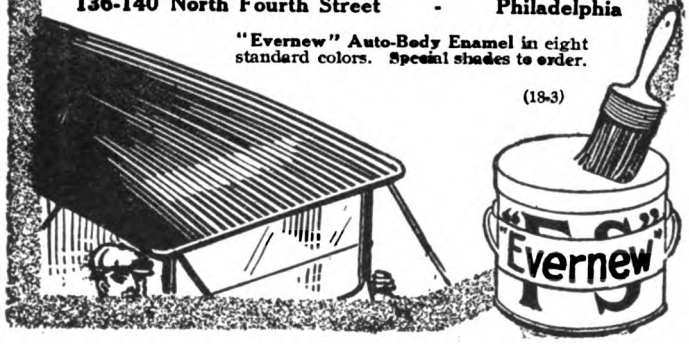
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"Evernew" Auto-Body Enamel in eight standard colors. Special shades to order.

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Complete---Gas Burner

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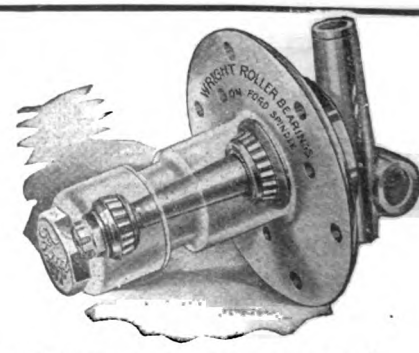
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BRUNNER SAFETY FUSE PLUG

IT WILL PROTECT YOUR AIR COMPRESSOR MOTOR AGAINST LOW VOLTAGE, OVERLOADS AND ALL UNUSUAL ELECTRICAL CONDITIONS.

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STOP FORD BEARING TROUBLE



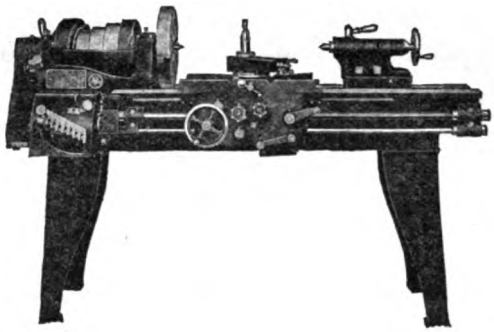
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Monarch Lathes are low in price and within the reach of every garage owner. They are used in every class of work from the finest toolroom work to production work in the largest factories.

Furnished with taper attachment, milling, keyway cutting and gear cutting attachments, and other attachments useful in the Auto Repair Shop.

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WAR CARS RUNNING

The Government says "it is important that NOT EVEN A POUND of steel be used except for essential purposes".

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Conservative driving will conserve steel, and every pound saved will **Help Win the War.**

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Sizes—1½" to 3¼"
Prices—$4.00 to $6.00

N. A. PETRY COMPANY, Inc.
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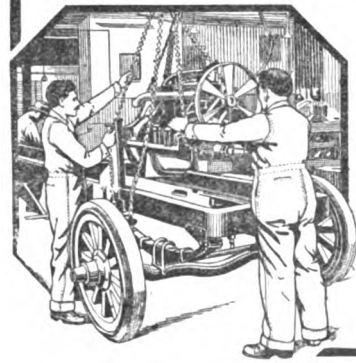
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It's fast color and *wears like leather.*

Coveralls, Overalls, Shirts and Pants
made of the genuine IRONCLAD KHAKI (the kind Uncle Sam uses) carry the yellow "Army label" like the above. LOOK for it and the Guarantee Bond in the garments before you buy.

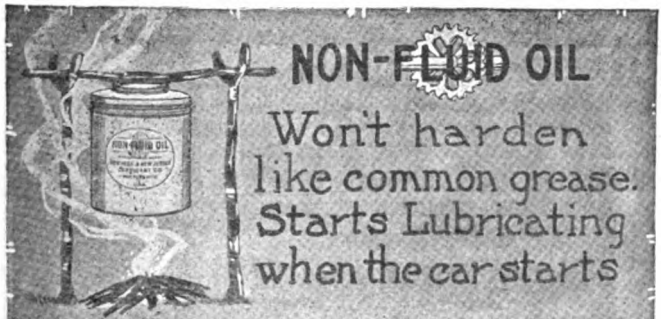
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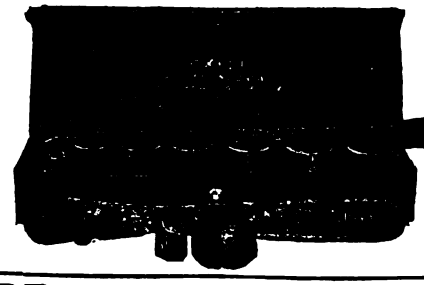
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If you are of this age and not merely in it—you will order Sedgley Wrenches before sundown this day—because you get real wrenches that pay a real profit!

"Hexall" No. 2 contains—7-in. steel forged handle, 2 screw-driver bits, 7-in. extension bar, 7 hexagon sockets. Packed in neat, strong cloth case.

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"Classic" Curtain Lights—*Improved*



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All screws banished.

Frames of very unique construction—simply snap together.

This grips the curtain material evenly and securely, making it impossible to sag and wrinkle.

It also makes a water-tight job.

A cutting pattern is furnished with each light, so that all trouble for trimmers is removed.

CLASSIC CURTAIN LIGHTS are shipped with glass permanently secured in the outside frame, thus eliminating all glass breakage in setting.

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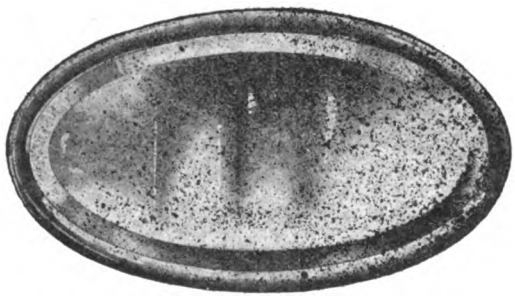


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We are prepared to make prompt deliveries.

We make these lights in three sizes only, namely:

No. 1—C, 7-9/16 in. x 12-1/2 in. oval
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No. 1-C

Joseph N. Smith & Co.
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FAWSCO
Improved Combination
Oil Cock Wrench & Cleaner
—AND—
Gasoline Gauge



Patented Pin Clears Stoppage
45c *Ask Your Jobber or Write*
J. H. FAW, Inc.
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"UNIVERSAL" Extension Pedal
One model for all styles and shapes of clutch and brakepedals.
Price with rubber pads $5.00
Plain $4.00 per pair.
RICH MFG. CO.
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ROLLER BEARINGS
ALL TYPES — IN STOCK — MANY SIZES
THE GWILLIAM COMPANY
ENGINEERS
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SAVE ONE-HALF THE COST OF A NEW TOP
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AUTO TOP SPECIALISTS
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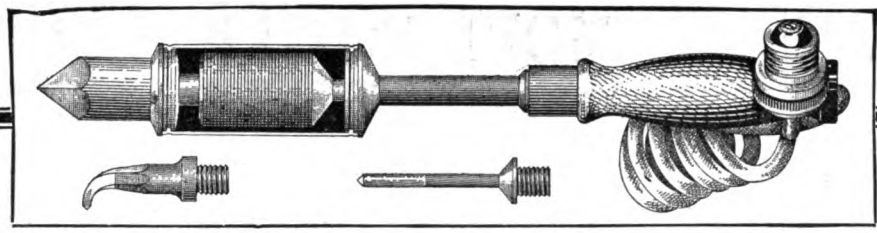
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ARE MADE WITH THE FAMOUS

"NO-BURN OUT" VEA HEATING ELEMENT

HEAT QUICKEST—RETAIN HEAT LONGEST

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MOSCO SPECIALTIES

Mosco Socket Nut and Bolt Holder for Ford Car

A REAL TIME SAVING DEVICE. Takes the place of that other man whose help is usually required for this operation.

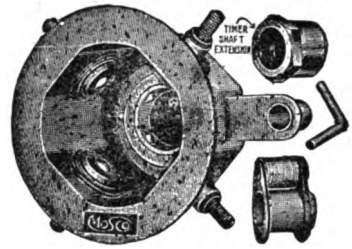
Simply slip MOSCO Nut and Bolt Holder over the top of each engine or Transmission nut or bolt head, the wings protruding above the hex socket engage wall of crank or transmission case and prevent nut or bolt head from turning while the man underneath the car unscrews the bolts. When replacing put head of bolt on top, slip on the MOSCO socket and proceed as in taking out. Made of heavy pressed steel, with reinforced wings welded to body of socket. All case hardened and finished bright.



POSITION ON CRANK CASE BOLTS

Price 15c Each.

Improved Bemus Ball Contact Timer for Ford Car



Cheapest in the long run.
All wearing parts renewed at cost of 27c.
Easier Starting.
Grease Cannot Prevent Contact.
Unbreakable Heavy Steel Shell.
Smoother Running.
Contact is Positive.
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No Fibre Ring to Wear Humpy.

Price $2.25.

YOUR JOBBER HAS THEM IN STOCK

MOTOR SPECIALTIES COMPANY, - - - WALTHAM, MASS.

Seamless Steel Tubing

Over 3,000,000 Feet on Hand.

2000 SIZES. YOUR SIZE IS HERE

ALSO COLD DRAWN SEAMLESS TOOL STEEL TUBING

WRITE NEAREST OFFICE

EDGAR T. WARD'S SONS CO.

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When You Can Obtain Far Better Results With

Permatex Gasket Cement

Produces a pressure-tight union that is gasoline, kerosene, oil and water proof and has a heat resistance five times that of shellac.

If Your Jobber Cannot Supply You, Order Direct

LIST PRICES

2-oz. Swab Bottles, 20c each ¼-pt. Cans, 30c each 1-pt. Cans, 90c each
1-qt. Cans, $1.65 each 1-gal. Cans, $6.00 each

CONSTANT A. BENOIT, JEROME AVE. & E. 18th St., BROOKLYN, N. Y.

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NO CARBON - MORE POWER - LESS FUEL



POPULAR SIZES 50c
Gives Results No Other Ring Can
Guaranteed Satisfactory, or Money Back
Write for free booklet A-2. Sold by leading jobbers

Bulletin No. 2

HOW THEY'RE MADE

"NO-LEAK-O" "oil SEAL ing" rings are made from a special formula of close-grained, tough gray iron, a few points softer than proper cylinder metal. Individually cast, retaining on the inside the skin of the casting, which insures long life and lasting resiliency. Finished to the utmost practical limits of accuracy, on special machine tools. Made under patented processes, by which even tension on the cylinder wall is secured, superior to any other process of manufacture.

The finished ring has equal bearing on the cylinder wall—the ring wears evenly. The cylinder wall wears evenly, and not oblong, which is the result with the use of most all one-piece rings.

"NO-LEAK-O" rings are not ground, but turned, leaving the tool marks. They will fit themselves quickly.

Mr. Repairman, Listen! This is Your Harvest. Don't Neglect It.

There are over 4,000,000 automobiles in the United States, say nothing of commercial trucks, tractors, etc. Old cars are being rebuilt. *War or no war* they must be kept running. "No-Leak-O" "oil SEAL ing" Piston Rings are *unlike any other ring* on the market. Simple, *one piece*, tough and springy, easy to install, not liable to break, and popular in price. *Send a trial order at once.*

LOOK OUT FOR BULLETIN No. 3

"NO-LEAK-O" PISTON RING CO.
AUTOMOBILE ACCESSORIES CO.
Sole Manufacturers 824 W. North Avenue, Baltimore, Md.



Don't Wait Until Afterwards

Auto Smash! 3 Killed, 2 Fatally Injured. Due to Mistaken Signals.

This happens every day.

When will your turn come?

Prevent the accident by providing your car NOW with the

SMITH AUTO SIGNAL

It eliminates hand-signaling and tells definitely, positively and unmistakably what you are going to do. The burden of proof is then on the "other fellow." Don't wait until afterwards.

SMITH SIGNAL CORPORATION, Mfrs.
WEISS & SINCLAIR, U. S. Distributors
53-55 West 66th Street New York
(Representatives wanted)



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Note how Smith Auto Signal shows to front and traffic policeman as well as to rear.

HOW FORDS RUN ON KEROSENE

When they are equipped with the

Olsen Kerosene Vaporizer

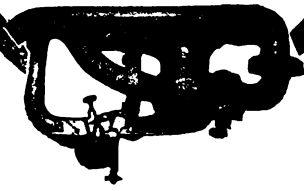
1. At 60 to 70% less cost 2. With much greater flexibility on all speeds. 3. With about 20% more mileage. 4. Without smoke, smell or waste. 5. Without skipping, stalling, or loading-up. 6. With perfect satisfaction in every way. 7. Write for our interesting booklet. (The Olsen fits regular carburetor—no engine changes.)

30-DAY MONEY-BACK GUARANTEE

Write for particulars

A good proposition is open to a few wide-awake dealers. Quick action necessary.

U. S. VAPORIZER COMPANY
213 State Street, Boston, Mass.



THEY COST NO MORE **LOCK ROLL** THEY HAVE NO EQUAL

HOSE CLAMPS

Are Helping to Win the War!

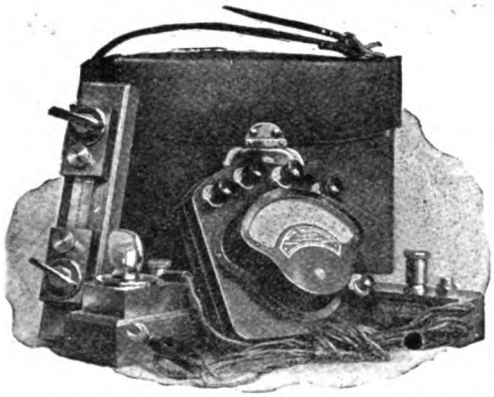
Scientifically constructed of steel. Nickel plated or (Parkerized Rust Proof). Stock sizes from 5/8" to 3½" by 1/8" variations.

Dimensions given are outside diameter of hose. Send for Samples, Price List and Discounts.

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Model 280

GARAGE

Testing Instrument

This is the most practical Electrical Equipment you can install. It enables you to locate electrical troubles in motor cars and apply the proper treatment to remedy them.

This Weston Instrument is considered indispensable by thousands of garage owners who use it. A very large demand has resulted. No competitive make of instrument is nearly so comprehensive in scope or dependable in operation.

In normal times, we can promptly fill orders; but under present circumstances, when government demands are exceedingly heavy and our raw materials can be used only for government work, garages should either furnish us with government contract numbers, when available, or place their orders subject to preferential delivery when it is possible for us to manufacture and make shipment of commercial orders.

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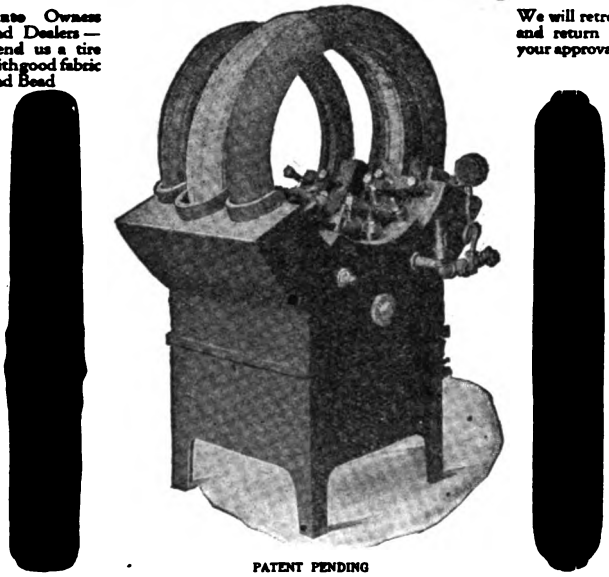
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Big Business—Splendid Profits

Zwebell Retreader and Tire Rebuilding Machine

Auto Owners and Dealers—Send us a tire with good fabric and Bead

We will retread and return for your approval.



PATENT PENDING

Never in the history of the tire business has the demand for rebuilt tires been so great as it is in this day of eliminating waste. You don't have to create the field—the field for your action is already created—it is a tremendous one and only waiting for more men. There will be no long drawn-out delay—you can go at it right now. We will post you on every point in rebuilding tires in sections and complete. This outfit pays for itself in so short a time, that it's surprising that anyone should hold back at all. It is a permanent business that will grow along with you as long as you live and then some. The Zwebell Retreader Has the Widest Range of Usefulness of Any Tire Machine on This Earth—It Has No Equal. Big designing engineers say so, and you want the best or none at all. Did you ever see a tire repairman who didn't have *more* than he could attend to? What are *you* doing—looking at the other fellows getting all the money and you just folding your hands? We will put you in "the swim" quick but you must write us a letter today—and don't fail to do it. We will explain everything—nothing will be left untold. This is the logical business for the Automobile Dealer, Garageman, Filling Station, to go into during this time—Conserve. Send for sample section of work done on this machine.

Zwebell Brothers Co., Mfrs., 486 Milwaukee St., Milwaukee, Wis.

At Our Risk-You Can Prove it.

DON'T waste good money on tire pumps that either break your back, or pump *Rubber Rotting* oil particles or gasoline fumes into your tires.

TAKE NO CHANCES

At our risk you can prove that the "DEAD EASY" is quicker, safer, easier and cheaper than any other tire pump, either engine drive or hand power. Convenient to carry with any car, it is always ready for instant service. The gauge showing exact tire pressure, there is no guess-work—and it's "DEAD EASY."



FREE TRIAL OFFER

Write Today, NOW, for Fifteen-Day—No-Money-in-Advance—Free Trial Offer.

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BATTLE CREEK, MICH. U. S. A.

Odd or Irregular Sizes

BRAENDER TIRES

Trade Mark

The manufacture of many odd or irregular sizes and types of tires has been discontinued as a conservation measure on the order of the War Service Committee of the War Industries Board.

We have many of these odd or irregular sizes in stock that were manufactured previous to the date when this order became effective. We have also the list of many odd or irregular sizes in the hands of our various dealers.

If you use odd or irregular sizes, send at once for prices and further information.

BRAENDER RUBBER & TIRE CO.,
RUTHERFORD, N. J.

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New Era "Better" Springs Stop the Breakage

New Era "Better" Springs are fully guaranteed, without restrictions, against sagging or breakage for one year and guaranteed to match in load depression the other springs on the car.

Dealers everywhere sell them



Demand New Era "Better" Springs for your car

TYPE B

NEW ERA SPRING & SPECIALTY COMPANY
1171 Hamilton Avenue, Grand Rapids, Michigan

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Get the Anti-Freeze You Can *Test*

WITH Norwesco "TWELVE-TWENTY" in your radiator you *know* you are safe to 20° below zero. With other solutions you merely *guess* and frequently guess wrong. About 100,000 motorists guessed wrong last Winter. A simple test with an ordinary battery hydrometer makes your protection a certainty.



NORWESCO
TWELVE-TWENTY
PREVENTS FROZEN RADIATORS

comes ready to use. No mixing, no measuring, no dissolving. Just pour it into empty radiator. Boiling point 12° higher than water. Evaporates slower. Warms engine quickly—less "popping" on a cold day.

Will not "find" leaks like ordinary anti-freeze solutions.

Made by creators of SE-MENT-OL, the radiator cement with a million users, and SKALEX, the radiator cleaner.

1-Gallon Can	$1.35
3-Gallon Can	3.90
5-Gallon Can	5.75

(West of Rocky Mts., $1.60, $4.65 and $7.00)

Our 20-page booklet, "Care of the Cooling System," contains some valuable suggestions.

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DEALERS—Write for our proposition and ask about our Saturday Evening Post advertising.



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Automobile Dealer and Repairer

A Journal of Practical Motoring

Registered in the U. S. Patent Office

VOL. XXVI. No. 3. NEW YORK, NOVEMBER, 1918. PRICE {10c. PER COPY / $1.00 PER YEAR

The Wise Family's Christmas



IS A month before Christmas, and the family of Wises are looking for gifts and other surprises.

They can take home for Mother, for Paw and the Kiddies, that will help Uncle Sam, and save dough for the middies.

Camouflaged ribbons, or toys that won't run, are all right in Peace, but we're fighting the Hun.

From the oldest Wise man, to the youngest wee mite, the whole family's looking for gifts that are right.

Things that are useful, conservative, fitting, that won't interfere with Aunt Sammy's knitting.

Far be it from me to break any traditions of Christmas even in a mechanical magazine—I have started this story with a jingle, used an initial letter showing our old friend Santa Claus, and sprinkled in a few holly leaves—thus indorsing my story with the Christmas stamp. Therefore I trust that the more conservative readers will look upon it as a real Christmas article.

The family of Wises are old New England folks, doubtless a few of the readers are well acquainted with them, but I won't tell their real name, for Mr. Wise is too well known in Rhode Island and is a reticent sort of a man who dislikes to see his name in print.

Like all business men, Mr. Wise had ignored (or forgot) the fact that Christmas was fast approaching, and 'twas at the breakfast table one morning that his faithful wife broached the subject.

"Well, father," said she, "what shall we give for Christmas this year? We don't want to wait till the last minute, as we did last year, and have to take anything we can find and give things that no one wants. Goodness knows it's hard enough to think up things without straining our pocketbooks too far.

"I have to buy four presents for you, three from the children and one from myself; then I have to turn around and buy a present for each of the kids for you to give them and a like number for me to give them—and by that time my poor brain is in a whirl. Can't you make just a few suggestions?"

"Oh, get them anything you want to," said Father Wise, who was ingrossed in his morning's paper; don't bother me—besides it's too early now, anyway."

"That's just what you did last year, left it all for me" (suspicion of tears). "I'll tell you one thing, Mrs. Wise, said father, "if you want a real, live war on your hands

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tell everyone to hand me out a necktie. That's what they did last year. Fourteen ties! Maybe I can be enthusiastic about one orange and blue tie with big splotches of black on it; possibly I can give a sickly smile when I open a second bundle and find a striped blue and black creation—but I'll draw the line at two—nothing doing when it comes to fourteen; I won't enthuse over them—that's final."

Having delivered himself to this ultimatum, Father Wise put on his hat and hustled to catch the train for the city, leaving his poor wife to plan her Christmas campaign.

Above all things, Mr. Wise is no slacker, and on the way to his office he thought over the proposition and during the day he revolved it in his mind, but did not reach anything like a solution until two days later.

Just two noons later—for he always walked twice around the block after lunch—he found the answer to the problem, and when he reached his home that evening he broke the news to mother that as far as he was concerned he'd settled the Christmas business once and for



What in the Dickens Can I Do with Fourteen Ties?

all, and that she need not buy anything for him to give anyone—he'd do that himself.

Let's throw in our reverse for a minute and back up for a week or so. Just around the corner from Mr. Wise's office there was an energetic accessory salesroom man who always made a point of being just one step ahead of his competitors. He had decided that there would be an especially big chance for the sale of automobile sundries and supplies for Christmas gifts and worked his brains overtime.

While the Wises were holding the little family "spat" at the breakfast table the bright salesman had been busy before breakfast trimming his window with Christmas gifts—the first Christmas display, by the way, in the city. The department stores always blossomed forth with elaborate displays—there was always a crowd of people around the windows of the toy shops—and even the fish market around the corner showed a Christmas spirit by making a special offer of three goldfish in a glass bowl for a half dollar.

If the fish market could make something out of Christmas, surely an automobile accessory store could do the same thing. It might take time and require lots of thought, but it would be worth while; so, as I said before, he spent one morning trimming up his window with Christmas gifts.

That he was successful was shown by the steady stream of customers who caught the idea from his window. He had placed a big fir tree in the middle of the window and upon the boughs had hung little packages, wrapped in holly and tissue paper. To each package he had affixed a price tag and had so arranged the tags that at the top of the tree there were a number for 25 cents, tire patches, gasoline gauges, and other cheap things; the higher priced articles were placed lower down and around the bottom of the tree he grouped lunch kits, camp chairs and tires.

At the front of the window he had a number of Christmas cards arranged in line, each one bearing one of the following combinations of words, all making the jingle: For Father—For Mother—and the Kids—For Auntie—For Uncle—and for His Nibs. Back of each card he placed a suitable gift that would be appreciated by that member of the family for whom it was intended.

It was this show window that attracted Mr. Wise on his first trip around the block on November first. I should have stated that Mr. Wise owned a family car, of which he was extremely proud. He spent 30 hours a week tinkering upon it, washing it, mending the tires and polishing the brass, and spent with his family three hours a week in it. It didn't always purr like a contented kitten and it didn't always go up the grades on high—but he was proud of it just the same.

The show window gave him the idea and he made several visits to the salesroom in the next few days until, as I have said, he had purchased all the gifts for his family.

That night at home, while he was pouring over an old automobiling instruction book which he had unearthed from in back of his gasoline tank, he remarked (casually, of course), "Saw a cracker-jack spotlight for only $5.00 round the corner from my office today; wish I could afford to buy it, but with Christmas coming on, guess I'll have to wait—'twould look pretty nice on the windshield of the old bus, make her look like a 1919 car."

Mrs. Wise took no chances that the light would be sold, and as soon as she finished the dishes in the morning she took a little trip to the city, returning with the spotlight for father, as well as the BIG IDEA.

An Automobile Christmas—something new; nothing useless and no duplicates. No one had ever thought of an Automobile Christmas, that's just why it would be so interesting.

And why wouldn't it be practical? Father was wrapped up in his old machine—the oldest boy "chauffed" for the family when father wasn't around; the younger members of the family always looked forward to the Sunday trip, and everyone had the greatest interest in father's car. If everyone received something they could

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use in the car, or on it, then the car would literally be "a family car" and belong to them just as much as the home.

Then again, "Uncle" owned a car and undoubtedly he would like gifts he could use on it just as much as father. Surely it would be fun to pick out automobile accessories as gifts, and that's just what mother did—



No More Frozen Feet for Aunt.

it's just what father did—and even the children caught the idea. The first time mother took little Harry into the accessory store the saleslady caught him trying to run off with one of the price tags from the show window.

Let's put our gears into high now and run the car along for a few weeks until we come to the day before Christmas. Mr. Wise worked in an office of a firm that had handled a number of large contracts, and consequently the "Boss" felt fairly happy, having shown a big profit for the year. Ordinarily he gave each employee a $10 gold piece. Mr. Wise usually received this same amount and had come to look for it at Christmas time.

He was due to a disappointment, however; he did not receive a small, heavy envelope, but a long, thin one. When he opened it he found a folded pasteboard, which proved to be a W. S. S. book with one stamp in it. Pinned to one corner was a little note, upon which was written the words, "Don't be a crank, it interferes with your good work."

Above all things, Mr. Wise was NOT a crank—he was the best natured man in the office, so he felt rather hurt until the "boss" came out to look over his shoulder and slap him on the back. Then he unfolded the note and this is what he found: an order on a nearby garage for a complete starting motor equipment which could be applied to his car. Boss said he never would take a chance on a Flivver unless it was fitted with a starting motor—it made him cranky, and he s'posed it would have the same effect on Wise.

Mr. Wise reached home that night a battered wreck, happy nevertheless. On the train his hat had been punched through with the handle of a toy carpet sweeper; a sticky youngster had clung to his coat tail with an equally sticky hand, which had left an everlasting imprint; but he had found a neighbor who owned a car just like his own and was having the same trouble with gas—therefore he was happy.

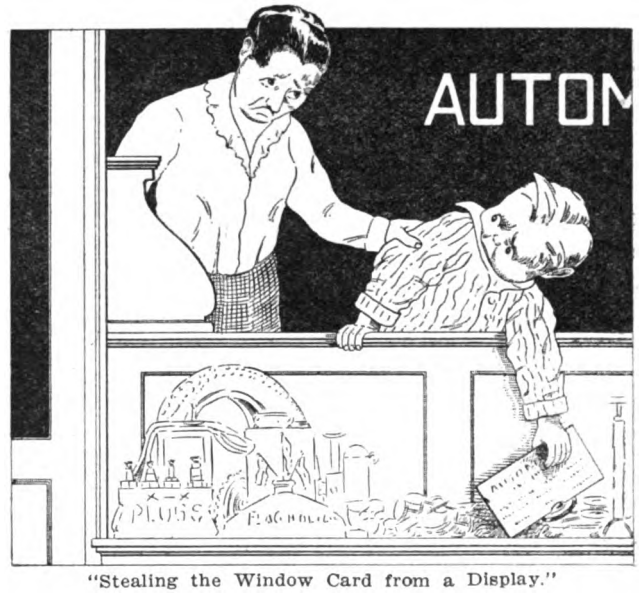
His pockets bulged with small bundles, his arms were full of mysterious packages, all of which he dumped beneath the tree in the front room; taking a second or so to inspect a particularly lumpy and mysterious bundle marked with his own name. "'Taint the spotlight," he whispered to himself; "wonder if mother took the hint?"

He didn't have much chance to worry about the spotlight that night, for he had all of the children's stockings to fill, nuts to crack, and much trimming to do, for mother had invited a liberal assortment of aunts and uncles, nieces and cousins to dinner and the tree the next day. It took him nearly an hour to persuade one of the children that Santa wouldn't get stuck in the chimney, and to put him to sleep.

Since this isn't strictly an ordinary Christmas story, I won't bother to tell about what the children had in their stockings, the real presents were hung on the tree and put around it. Father usually presided and handed out the presents and tried to make as many jokes as possible.

They say that woman's curiosity is a dominant feature of her make-up; it's lucky they don't know about men—father made a "bee-line" for that mysterious package which presented such a lumpy appearance. It looked like a combination of a fresh Virginia ham and a mandolin, with two warts on the side of it, and on the outside was written, "Save the drops and the gallons will take care of themselves."

"Looks like a new engine," said father, divesting it of its wrappings. It proved to be a combination intake and



"Stealing the Window Card from a Display."

exhaust manifold for the Flivver, from his brother, and father's smile was so broad that it endangered the back of his neck. "Been wanting one of those manifolds for some time," said father, "but just haven't found the time to have one installed. The old engine has been consuming lots of fuel lately, but guess this will fix it."

"Just to show you my heart's in the right place, here's

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something for you—says on it, 'Time is money; here's riches'; hope you'll like it as well as I do the manifold."

Uncle's present proved to be an eight-day automobile clock with an illuminated dial that could be seen in the dark. Uncle was pleased, for he knew how nice it would look on the dash of his Hudson car.

Gifts and presents followed for the children, for mother and the nieces, and it was a noisy time—the youngest boy made life hazardous for the rest of the people by recklessly operating a miniature automobile around the floor; said machine being fitted with a raucous horn, a windshield that could be tipped (and was) at any angle, lights that would light (for a short time) and a crank that would "wind" up the engine.

"For an inquisitive amateur repair man," said father as he handed out a small, round package to one of his nephews. A "wow" of joy from the recipient proved that the gift was welcome; a small trouble lamp that



"My Car May Be a Flivver, but Even That Has Four Wheels."

would wind into the dash upon a small reel. "Just what I want myself," said father, "so I judged you would be rather pleased."

"So you can look into the future," proclaimed the next tag—"from mother to father." "That's it—that's it," shouted the delighted pa as he removed the wrappings. "My, what a beauty, a spotlight; and I'll be durned if it isn't a trouble light, too. Cord winds inside on a reel—good-bye, folks, I'm off to the garage."

But they wouldn't let him go until all the presents had been given out. "A start in business, for sonny," proved to be a wonderful combination—vise, drill, lathe, and, in fact, what amounted to an entire machine shop. This present for his oldest son from father was made with a purpose. Son was to overhaul father's car during the winter, and father intended that the job should be done right.

Later on the son received an electric engine heater (he was usually called upon to do the cranking on cold mornings) and rejoiced knowing that he could start the engine without cranking his head off. "To help you up in the world" proved to be a handy automobile jack, and "For a gentleman mechanic who likes to keep clean" was a half dozen cakes of special hand soap.

Father kept mother waiting some time for her big present, which was lettered "As warm as my heart." A fine, big automobile coat that had nice warm pockets and a high collar. Mother voted for a ride in the machine that day, just to try the coat.

"A special place for the youngest," was the inscription on a bulky package for the smallest Wise boy. It proved to be a collapsible auto seat, made of leather and with a nice low back. It would just fit in the tonneau of the Flivver, and the youngster, who always sat on the floor, gave a sigh of satisfaction.

"Don't have cold feet." This was written on a big square bundle for mother-in-law. She always complained about the cold floor of the tonneau in her car. It spoiled her winter trips, and though it was a closed machine she seldom rode in it for that reason. The present proved to be a small heater, which could be attached to the exhaust pipe and would give a comfortable warmth, even to the tonneau of the machine itself.

"Little drops of water make the windshield foul,
Make the careful chauffeur grit his teeth and scowl,"

was the inscription on a bundle for father which contained a wildshield wiper. Father also drew a package which contained one shock absorber and the caption, "Smoothing out the bumps from the road to happiness."

"Even if my car is a flivver it has four wheels," said father. "One shock absorber is 25% welcome—thanks one-quarter's worth. The other three shock absorbers were found in due course. The whole set of four cost too much for one person to give him, so four people clubbed together and each gave him one.

"A good friend who will stick to you," proved to be a box of tire patches from the youngest, bought with money he had earned picking strawberries.

One of the aunts was made happy by receiving a thermos bottle and the other aunt received a heavy automobile robe in which there were pockets for the hands.

"So that you can find yourself," inscribed on a package for uncle, proved to be a route book of New England. (Uncle had managed to get lost in the wilds of Vermont twice the preceding autumn on a hunting trip.)

As the younger member of the family opened a peculiar looking bundle, the air was rent by a terrific squawk and the youngest produced an automobile horn of diminutive size for use on his bob-sled. A little later he received a flashlight and thereafter he paraded the house, a lifelike and noisome imitation of an automobile, alternately blowing the horn and flashing the light.

With joy in his eyes father reached for the last bundle—high on the tip of the tree. It was for him and inscribed with the enlightening question: "What is home without another." The package contained three neckties, but the donor's name was missing.

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The Retail Store Window a Gold Mine

An Attractive Show Window Display at Christmas Time Is of Paramount Importance To Every Merchant; It Acts as a Silent Salesman

BY FRANKLIN MYERS

ANY store publicity campaign, if developed along broad lines and concentrated in support of a consistent, well-balanced and thorough-going program, is bound to be a success.

There is nothing accidental about success—it isn't luck or genius—but hard (?) work and concentration. Form a habit of good window displays and the question mark after "hard" slips away without one being aware of the fact that it ever had a place in the line.

It is possible to demonstrate a larger and more important truth than that window dresssing is hard work. It lies sometimes in the point of view. The great university of human experience tells us that prompt and vigorous action will dissipate all thought of procrastination. Many things could be started and half finished while one is thinking whether it is worth while going ahead and making good one's title to supremacy.

Any program is constructive and workable if we will but make it so.

The feeling of perfect confidence in what one is about to do is worth much. It is the mainspring of established trade. There is a boundless satisfaction and a sense of security in knowing that one is keeping abreast of the times. The intelligent storekeeper who inadvertently becomes a procrastinator is invariably conscience stricken



Spread the Idea of an Automobile Christmas, Trim Your Windows and Feature Santa Claus, but DO IT TO-DAY.

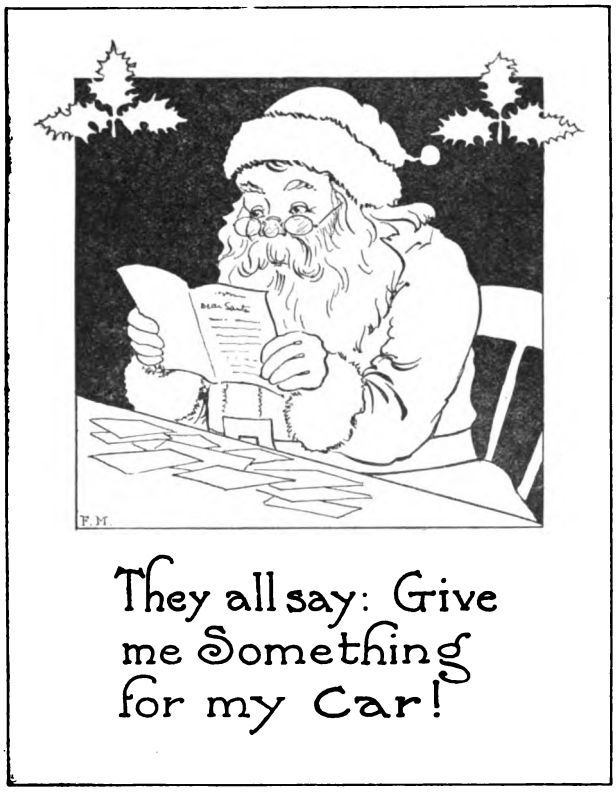
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—because conscience works better when it has a steady job.

Within the past fifteen years standards of quality have been established in window displays and store service. It's all a matter of service anyway—and service is not a vague, meaningless something, but a live, vital, present force in business building.

A man said to me the other day—pointing to a beautiful big auto accessory store on the opposite side of the street, "In that store's rapid rise to recognition you see a succession of brilliant and easily won victories."

The victories only looked as if they were easily won—the proprietor with the aid of good clerks who understood twentieth century service made it a real store—it was a lesson in the separation of the real from the apparent—the permanent store from the mushroom.



It meant an immense amount of work—but not hard work, because the proprietor wasn't the kind of a man to take work that way. All work is pleasant—if one does not feel this way about it, his liver is out of order and a corrective is needed. This man and his clerks found self-development and happiness in the service of others—an ideal worth striving for.

A limited individual horizon is a clerk's greatest handicap. Have your opinions based on an evenfooted acquaintance with life and folks at their best and you can't help being good-natured. This counts for good service in a store and should be sufficiently emphasized in the clerk's make-up to secure to him the good-will of customers, which in turn places prestige to his credit and a substantial raise in salary at the end of the year.

Myers Mopped the Floor.

Christmas is now calling us, and I want to call attention to some Christmas store and window cards that I have drawn for this article, but somehow I must tell this story first. It applies to my subject and it may prove amusing.

This incident happened in the southern part of the State of Texas. I was painting scenery at the time for a big annual fair, but for the moment I had run out of the cigar store to get a smoke and stood just outside getting the spring sunshine when a lady came up to me and, glancing at my poor clothes—old clothes which I invariably worked in when doing large scenic work—she said: "You poor man, and you have such an intelligent face, too, will you do a little work for me around the corner at the charitable institution? I will pay you for it."

"Yes, madam," I replied, "I would be glad to do it for you." She got me a mop and a pail and showed me where to get the water and I started in mopping the floor. There were four very large rooms and it must have taken me about one hour.

When I had finished she wanted to know how I had gotten down so low in the world, and didn't I wish to reform, etc. She handed me fifteen cents, and I gave it back with the remark that I wouldn't take money from a charitable institution. "Well, I know, that's all right," remarked the lady, "but you've got to eat."

"Yes, that's true, too," said I, "but I'm going to the St. George Hotel in a few minutes, just as soon as I change my clothes." "O then you're not a needy subject," ejaculated the lady. "Well, yes, I'm a needy subject all right," said I. "What I need is advice on how to save money—I've got about twenty-five dollars in these clothes and next Tuesday when my contract for finishing up the big show around at the Fair grounds is completed I will have four hundred dollars in my best Sunday suit, and I don't know whether to spend it all in one night or make it last as long as two days!"

I merely mention this little incident to show that a man can do menial work without a thought that it is in any way degrading. The lady was anxious to have the floors cleaned—she was much concerned about it and men were scarce down there at that time—I was my own boss and I helped her out.

A Word to the Sales Force.

So many salesmen complain about their extra work of dressing windows as being commonplace and all that sort of thing. Compel yourself to be good material no matter what position you hold. As a man thinketh, so is he! You cannot build a man out of poor material any more than you can build a delicate and complex structure of humanitarian civilization upon socially negative and destructive doctrines.

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We know that the great percentage of all men in all lines are failures, and we know equally well that most men who have failed financially and morally are those who first failed mentally and physically. A man knows whether he is making progress or whether he is on the down grade, and if this is a fact, to whom, to what place are we to look for the solution but to the individual himself.

You analyze a man who has made a success of anything and you will find a strong fiber running through his entire make-up.

Whatever you set out to do, know this: IT IS YOURSELF, NOT CIRCUMSTANCES OR CONDITIONS OR INFLUENCES, which will make your success. It is what you FEEL, what you THINK, what you DO—not any one of these, but all of them.

Nerve and ability work in the same direction, but nerve usually gets there first. Nerve and disability will work the same way—you see this illustrated every time you happen to observe a slip-shod, "nobody home, run down at the heels" store window. A man must have an awful nerve to deliberately rent a store on a public street, go into business in a "maybe I'll win" fashion, and expect the dear public to flock to his counters and pour coin into his cash register—if he has one.

"Sure Thing Smith."

I was directing an advertising campaign in a Western city not long ago, and the nearest route to the office from



my hotel took me through one of the most popular thoroughfares. On this street there was a store, splendidly situated, with liberal frontage and everything to make it a very desirable spot for some good, live, red-blooded business man. It was one of that kind of stores (the way it was being run) that made you feel every time you passed by that at any time, any moment, you might expect to find a death notice pasted on the door; and soon after



you might expect to find that the store had changed hands.

In other words, the man inside was really dead, anyhow, but somehow they had forgotten to put the notice to that effect on the door. It got so on my nerves that I deliberately walked in one day and asked the man behind the counter what he would take for the store just as it stood. His reply was somewhat evasive—"I don't exactly know—you'll have to see the boss—I'm only a hired man."

After a little further talk with the clerk I learned that the boss could be seen any morning before 11:30 o'clock. I also learned that the stock was clear of all encumbrance, that the boss was a fairly decent sort of a chap, but "didn't believe in all these new-fangled advertising ways, because it cost too much," and, anyway, he was sure that "most of the fellows that advertised never got their money back."

Of course, naturally, I was astonished at such ignorance, but I did not show it. I was just about to go when the boss came in. I asked the clerk, who had my card, to introduce me, and he did so, handing the boss the card.

"Nothing in your line for me," said he. "I've kept away from that sort of nonsense all my life, and I'm too old to throw away money now."

"Mr. Smith," I replied, "I do not ask you to purchase anything from me, but if you will listen just one minute

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I have a proposition that I think will interest you. If you will give me the privilege of advertising your goods right here on the premises, using both your show windows, your walls and the tops of your show cases—give me my own way entirely with the advertising end for two months—I will guarantee to increase your business 40 per cent.

Mind you, I do this all at my own risk. I do not ask you to spend a penny until I demonstrate to you that I have made much more for you than what my charges will come to. If I do not increase your business at least 40 per cent., I lose."

"You seem to be pretty sure of your ground, and as far as I can see, I can't possibly lose."

"That's just the point, Mr. Smith; no other kind of a proposition would appeal to you; that's the only way I can wake you up! And from now on I am going to advertise you as 'Sure Thing Smith.'"

There was nothing the matter with Smith only he was very conservative—he really believed in advertising, but he couldn't let go of funds long enough to see and get results.

I had my special store plan man take his store in hand, and what he didn't do to get the eyes of the people to that store was never thought of. Things went so well that we stayed another month and broke in a man to



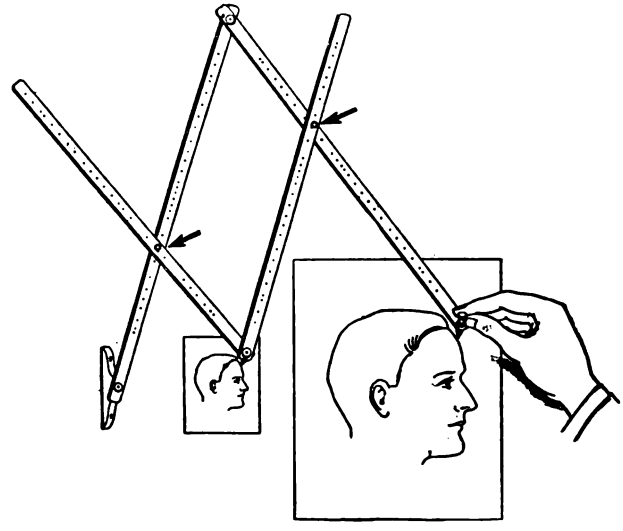
Arrange a Santa Claus Booth Inside the Store, if Possible.

carry out some general plans for Smith for the balance of the year.

Smith admitted that his business had increased in those three months just 43 per cent., a little over what I bargained for. "Sure Thing Smith" is known all over that Western city.

And after all, what were the main features of the campaign for "Sure Thing Smith"? First of all, clean windows; next, good window displays with price tickets on the goods; next, pictorial show cards; next, circularizing the neighborhood with detailed lists of what he had to sell.

And last, but not least, every business house within a radius of a mile was supplied with blotters—five blotters



A Pantograph Can Be Used For Copying Any of the Show Cards in This Article For Your Window.

to an office, and each blotter advertising a different article, each blotter invariably carrying a little idea cut to catch and hold the eye. All the store cards carried illustrations. People like pictures.

The old-time plain cards are fast going out, they're too cold. Pictorial cards have a friendly conversational tone and reflect the personality of the store. Why we even got "Sure Thing Smith" so that he could shake hands without thinking he was doing you a favor.

He owns that store now personally, and the entire building. He has enlarged the front and has built out at the back, and does a business that requires the undivided attention of four clerks.

Talk advertising or publicity to "Sure Thing Smith" now and he'll listen to all you've got to say, and he can tell you something about it himself from experience. He's a pictorial window card fiend.

Several ordinary advertising campaigns were picked up in that city outside of the main issue I was busy with, and my, O my, how many other stores needed the pictorial window display and card stunt it's a shame to tell. It is always easier to stay in the old rut than to blaze new trails for yourself.

Window Display Card.

To pull out of a rut and start on an unbroken path means naturally some labor and trouble, so most of us stick to our own ruts. And yet, where would the world be today if no one had the courage to blaze the new trails?

Failure is a habit. Success is a habit. But you can't mix the two. The habit of study is the habit of success. The habit of killing time and shirking is the habit of

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failure. The habit of success is just as easy as the habit of failure, once you have acquired it, and it pays.

The Ambitious Clerk.

The store clerk who is ambitious and wishes to fortify himself in his position ought to get busy with the pictorial window and store card.

The small prints that appear in this article may be enlarged to window card size by the use of that simple but very able little instrument—the Pantograph. No special experience is required—full directions come with each one.

The Pantograph may be obtained from any up-to-date art shop at prices ranging from 25 cents to $1.50, and I think it is advisable to use the better instrument.

Try and arrange for a Christmas Gift Selling Booth inside the store. A large Japanese parasol painted white, with cotton batting thrown over the top and a Santa Claus of painted card board holding up parasol, will make an attractive booth at trifling cost.

If you wish to have a real, live snow storm back of booth or at back of window you can have it by using our patented snow storm machine. Write the magazine for more particulars.



The Metal Turning Lathe.

Part 4—Shaping and Grinding the Lathe Tool, Cutting Threads, the Use of the Steady Rest and Correcting Centers.

BY J. F. SPRINGER

THE grinding will be a matter of resurfacing the top face and bringing it to a new flat surface parallel with the old. If the nose needs, however, to be heated for the purpose of reforging, we may have a good deal to do besides. It would seem advisable to seek to avoid all reforging if possible, in order to prevent warping and other deformations, which lead to the necessity for extensive grinding. Now it may happen that, when we regrind a dull tool, even though we grind only the top surface, we may heat up the edge enough to destroy part of its hardness. This will require that we reharden the tool. And rehardening requires reheating and possible warping.

Care In Grinding.

The thing to do, then, would appear to be to handle the grinding in such a way as not to affect the hardness. About the only sure and simple way is to grind in water. We may arrange for a stream of water direct onto the nose of the tool. Let this stream be rather a generous one, fully up to its duty of carrying off the heat generated by the friction of grinding. If this is done, we may reasonably expect that, in many cases at least, we shall have no other grinding to do after we are once at work than the mere resurfacing of the top of the nose end of the tool.

The grinding and regrinding will naturally result in wearing down the nose of the tool on top. We will need to pay attention from time to time to the matter of making sure that this top surface is exactly on a level with the axis of the prospective screw. This is an important matter, wherever an accurate screw thread is to be cut.

In cutting a screw thread, as in lathe work in general, the final cuts should be very light ones. This matter is, of course, regulated by the hand.

Screw threads are of many kinds. One of the principal varieties is the 60-degree, sharp V thread. With this thread an axial section shows an equiangular triangle, each of whose angles is 60 degrees. The corners are either left sharp or are rounded a very small trifle. The groove is precisely the same as the thread. There

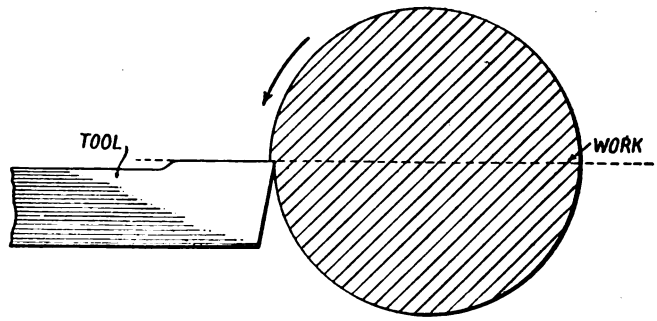


Fig. 3.—The Top of the Cutting Edge of the Tool Nose Should Be on a Level with the Center Line of the Work.

is another type of thread in which the top of the thread —and the bottom of the groove—is flattened.

Then there is the Whitworth (British) thread in which the angle at the top of the thread is 55 degrees. So also with the bottom of the groove. Then the top of the thread and the bottom of the groove are decidedly rounded. There is also such a thing as a square thread, including a square groove. The lead screw on the lathe

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will probably have a square thread. But the threads that are more or less pointed are the ones in common use. They may be cut by following the directions I have given.

Making the Tool.

Perhaps the most difficult matter will be the making of the tool to do the cutting. The vital thing in forging and grinding the cutting end will be the accurate shaping

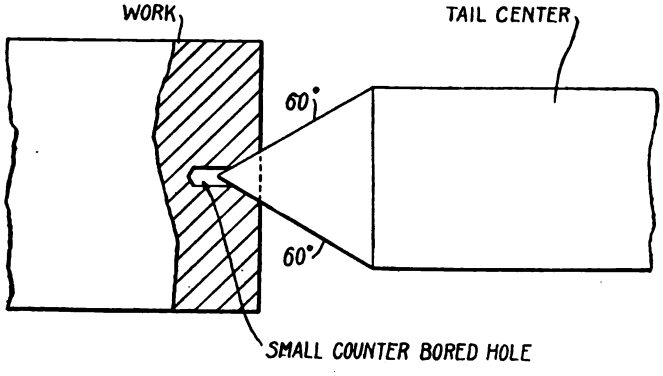


Fig. 4.—Showing Section of Counterbored Work and 60° Tail Stock Center.

and sizing to the exact form and size of an axial section of the proposed screw. This work done, the rest ought not to give much trouble, unless we attempt to deviate from the directions I have been giving.

The work of screw-cutting that I have been explaining concerns particularly external threads. In the shop, however, we shall have to deal with internal threads as well. Ordinarily we will do the cutting by means of taps.

Let us now consider a point or two with regard to the mounting of the work for external screw-cutting. The work will ordinarily be put together in a chuck and be supported entirely by the head stock or else it will be mounted between centers set in the head stock spindle and in the tail stock. Where the latter method is applicable, it will probably be found to give the most accurate results. There are many cases of work having small diameters and short length for which a mounting between centers would be almost or quite absurd. Then there is work which cannot well be set up between centers.

There is one thing to remember with great faithfulness in connection with work mounted in a chuck: Never disturb the work after it has once been secured and the cutting started. Work mounted on centers may be taken off when half done and put back again later for finishing, without serious danger of getting it "out of center;" but this is not the case with ordinary mountings in chucks. When you have once begun, then, don't let up until the job is finished. Of course it may be left on the lathe over night or over Sunday, provided it is not disturbed. The cuts should be light, even from the beginning. This reduces the work's liability to dislocation or to bending. A fairly high speed and a very light cut is the combination suitable to thread cutting.

I have already used language implying that exactness might be expected when the work is mounted between centers. This should be understood in reason. It is possible to mount the work imperfectly, which will then make errors possible. Besides, work mounted between centers will often be long and of rather small diameter as compared with the length. Such work is liable to bending during the cutting operation. There are at least two remedies.

The Steady Rest.

First, the work may be supported at a point intermediate between centers by means of a **steady rest**. This is an upright frame or bracket suited to support the work without interfering with its rotation. The steady rest may be shifted from point to point as the conditions at the moment demand and permit. The second remedy is gentle cutting. High speed and a light cut constitute again a very good combination.

I come now to the matter of mounting the work on the two centers. The center in the spindle of the head stock rotates with the work—it is a live center. The tail stock center, on the contrary, remains fixed. The work twists around on its point. The two centers have conical points. These should be neither too slender nor too blunt. If the full angle of the conical vortex is 60 degrees, the center will be just about right for average work.

Conical holes, also with 60-degree angles, are bored in the ends of the work. These should be deep enough to cause the support given by the two centers to be supplied in part by rather thick portions of the center points. Then the conical holes should be bored deeper at the bottom by an ordinary cylindrical drill bit of small size. The depth of these little holes should be more than sufficient to enable the conical center points to be introduced

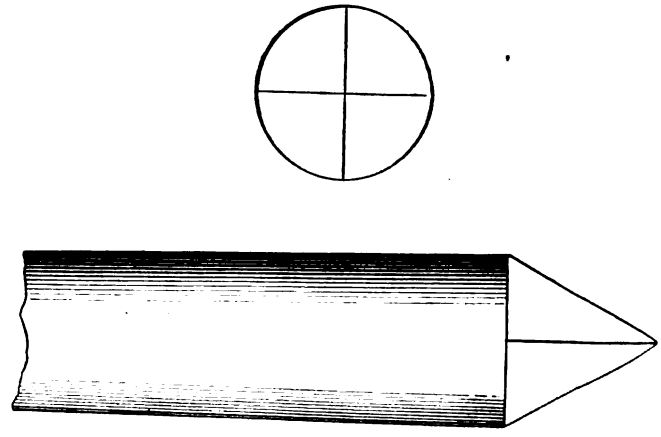


Fig. 5.—Hardened Tail Stock Center with Pyramided Point for Correcting Centers.

into the conical holes and brought up tight without running any danger of the extreme tip of the center point coming into contact with the metal of the work. Make the little holes deep enough and to spare. The object in view is to prevent damage to the tip of the center.

The lathe operator may find that it is not at all easy to bore the conical holes so that the work will run true. There are two difficulties. First, the holes may not be started in the exact centers of the ends of the work.

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When it occurs, this is a bad error and calls for correction before going on with the work. The second difficulty is to keep the conical hole central with the work as we continue to bore it.

It is a bad error to get these holes out of line with the axis and consequently very probably out of line with each other. However, in respect to both difficulties, it may be as well to say at once that slight errors may often be corrected.

The following method may be used with a view to correcting small displacements of center holes. Provide a piece for the tail stock that shall be a duplicate of a center point with the exception of two things. First, instead of a conical point, a three-cornered or four-cornered pyramidal point is used. Second, this point is to

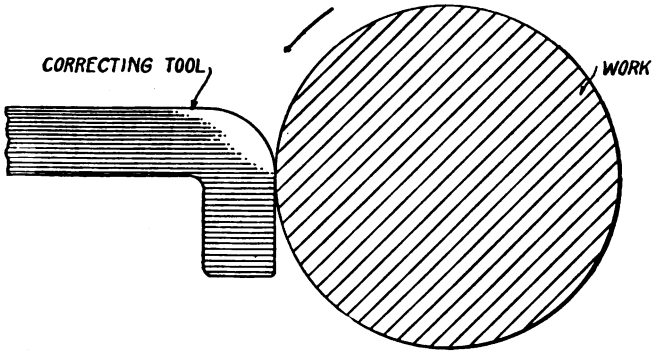


Fig. 6.—Illustrating Method of Correcting Center Hole, Slightly Out of Center with Axis of Work.

be hardened. It is proposed to use it as a boring tool. To do this, the work is run on this tool as if it were the dead center.

Correcting a Poor Center.

Use plenty of oil in the center hole and on the center point. Now bring a tool up close to the work—say, half way between the ends—as if it were the intention to make a cut. By rotating the work, by running the lathe slowly by hand, it will be noticed that the work approaches and recedes from the end of the tool. This is because the center holes are wrong. Now, instead of a cutting tool, bring up against the work a blunt piece of steel. Have this piece held firmly in the tool post. As the work goes round, the hand being used as before to effect rotation, the work will rub the blunt end for a moment and then be out of contact with it.

The idea now is to gradually force the blunt piece against the work. A slight cutting action will start up in the center hole at the tail stock end of the work. Continue to press the tool forward until the work runs perfectly true and bears evenly against the blunt piece all the way round. The operator must judge when he can use power to work the lathe. When beginning with power, begin with a very slow speed and feel your way.

When the hole at one end is in perfect shape, take the work out and reverse it. Then do the same for the center hole now bearing against the pyramidal center point in the tail stock as you did for the other hole. Start by working the lathe by hand, and feel your way as before.

CLEAN THE OILING SYSTEM.

Do Not Expect To Avoid Big Repair Bills Unless You Attend to the Oil Supply and Keep the Engine Lubricating System Clean.

THE average car owner is prone to follow the instructions which he finds in the book which accompanies his car, and he is careful to do nothing, unless he finds a suggestion in a magazine or in that same book of instructions.

He fills the base of his engine with lubricant when oil is necessary, as indicated by the gauge, and he is careful to see that the oil flows through the gauge, if there is one, on the dashboard, or careful to see that the pressure remains at a certain figure while the engine is running. The instruction book does not always advise the owner further regarding the oiling system. At the present time, however, more instructions are necessary.

You may have liquid in the base of your engine, but is it a lubricant? Many times this liquid is a combination of cylinder oil and kerosene. Its lubricating properties are poor, and should the bearings burn through lack of oil the owner is very apt to blame the oil for the trouble. He immediately buys oil of another grade or oil that is made by another manufacturer, without, however, knowing the reason for his trouble.

Depending upon the type of engine, oil in the base should be changed regularly. Old lubricating oil should be drawn out from the base and thrown away and new put in, for at least every thousand miles of riding. In some cases it is advisable to renew the oil much oftener.

Make a point of cleaning it with kerosene every time the lubricating oil is renewed. Put in about one quart of kerosene and turn the engine over by hand, with the petcocks open, a dozen turns or so. The kerosene oil will dissolve the particles of grease and have a tendency to drive out the dirt. It is not advisable to run the engine while the kerosene is in the base. It may do no harm. On the other hand, there is a great possibility that it will damage the engine.

After the engine has been cleaned in this way, draw off the kerosene, and while the drain cocks are still open turn the engine over two or three times in order to drive the kerosene from the system. Clean the pump strainer if there is one, then put in a good grade of oil.

AN EXPLANATION.

The delay in issuing the October number of the Automobile Dealer and Repairer was caused by a strike of the Press Feeders as the result of which our entire edition (only partly printed) was held up for several days. We regret of course the delay in mailing this edition to our subscribers, but they want to reflect that when a Labor Union takes a notion to go on strike it does not for one moment consider the wishes of the publishers or care how much inconvenience or loss may be entailed by their action.

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The Care and Repair of Bearings

Part 2—Your Engine Will Knock Always Unless You Exercise Great Care in Scraping the Bearings.

BY J FRED GILMAN

WHILE ball or roller bearings are usually of great importance in the automobile, they are seldom used in the engine itself, the main part of the machine.

The engine is usually fitted with bronze or babbitt bearings, made in halves and carefully fitted to the shafts. Manifestly a soft babbitt bearing will not keep its shape unless it is fitted to the shaft. If it contacts upon a small surface it will soon be hammered out until there is considerable play in the shaft. On the other hand, if it is clamped tightly upon the shaft, excessive friction results and the babbitt is quickly burned by the heat.

To locate the points of contact, the points where the shaft runs against the babbitt, the prussian blue method is used. The shaft is coated very thinly with prussian blue paste and the bearing put into place on the shaft. The high spots are "printed" upon the bearing, and these high spots must be scraped off. The action is repeated again and again until the shaft contacts with the bearing upon practically its whole surface.

We all know how very much more difficult it is to keep your "print" when fitting bearings to an easy-running fit. The reason for this is that when a shaft is put up tight, the shaft tends to distort the case to its alignment, and *vice versa*. It might be possible to scrape in a shaft so that it turns very easily, and if the shaft is straight and bearings show a print practically all over the alignment will be practically perfect. But where can we get the men to do it, and what will the customer say about the time spent?

Scraping Bearings.

The scraping of automobile bearings has always been a job of more or less uncertainty and is recognized by all repair men as a difficult task, requiring the best men obtainable, to put up a set of bearings that will line up and fit the shaft as they should.

When the engine base is placed on a suitable stand, fitting bearings is an easy matter, as the effect of tightening any of the boxes or journals is easily determined by inserting a bar of iron or steel between the flywheel retention bolts on the crankshaft flange and turning that member with the bearings tightened to the proper degree. This is the method of turning the crankshaft when the bearings are being scraped in by fitting.

The camshaft supporting bearings need attention, but these are plain bushings for the most part and new ones are easily made and inserted. The method of retention is fully as important as proper fitting. Even in such a simple matter as securing bushings there is a right and wrong way, and it is noticeable that the majority of mechanics use the less desirable method. For instance, the cone-ended set screw may be screwed in so tightly as to cause the bushing to bulge slightly under the point and bind the shaft, especially if the wall of the bushing is light. Then again, should the set screw become loose, the bushing can move out of position, an undesirable feature, especially if two holes are supposed to be kept in register by this means.

Before refitting the main bearing it is desirable to remove the engine flywheel from the crankshaft to facilitate handling that member.

If the engine knocks when travelling over level roads, regardless of speed or spark lever position, and the trouble is not due to carbon deposits in the combustion chambers, it is reasonable to assume that the bearings have become loose and there is lost motion at the main journals, the connecting-rod big ends, and possibly the wristpins.

The main journals are usually proportioned with ample surface, and will not wear unduly unless lubrication has been neglected. The connecting-rod bearings demand attention from time to time, however, and sometimes the main bearings will be loose enough to warrant taking up.

After the bottom of the engine base has been removed, exposing the internal mechanism, it is not difficult to ascertain the condition of the bearings and make the proper adjustment to compensate for deterioration.

When the bearings are not worn enough to require refitting, the lost motion can often be eliminated by removing one or more of the shims separating the bearing cap from the seat, care being taken that an even number of shims of the same thickness are removed from each side of the journal.

If there is considerable lost motion it is advisable to dismantle the engine and examine the crankshaft and the journal brasses. If the shaft is scored or cut in any way, as often results when bronze is used, and the bearings do not receive clean oil in sufficient quantities, the surfaces must be trued up, either with a fine file and emery cloth, or by means of a lapping tool. The latter is preferable, as the file and emery cloth will only tend to smooth the surface, while the lap will have the effect of restoring the crank to proper contour.

In many garages it is the custom to put in bearings in the following manner: The shaft is taken, as removed from the crank-case, without any attempt at straight-

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ening; a light coat of prussian blue is applied to the journals and the shaft then rolled in the upper half bearings, the bearings being supported in the upper half of the case, which is inverted and placed upon a jack or other device.

The high spots, as shown by the blue from the shaft, are then scraped off and the shaft again rolled in the bearings, and the high spots scraped, until in the judgment of the mechanic there is a sufficient area of bearing surface. The shaft is then laid in the upper bearing and the blue again applied, a shim or shims removed, and the caps bolted in place. The shaft is then revolved to show prints on the caps, the caps then removed, and the high spots scraped until they show a satisfactory surface. The job is then considered finished.

The difficulty with this method is that the shaft is scraped in under conditions that do not prevail when the engine is assembled. All prints should be taken when the caps are bolted down on the shaft. If the prints are taken as described, in the upper half of bearings, one will find that the shaft assumes a very different position when the caps are bolted down.

An easy way to prove this is to scrape in an engine as above described, and after the job is all done scrape lightly all the high spots from the upper half bearings and caps, then blue the shaft and take a print of both bearings with the caps bolted down.

One of the best methods that I know of for producing a good job is as follows: First, it is useless to attempt to scrape in a set of bearings with a crooked shaft. The shaft should not run out more than .001 inch, and if the journals are out of round, or tapered, a very good way to put them right is to put the shaft on centers in a lathe, if a grinder is not available (and it usually isn't), and take a very light chip over the main journals; usually from .003 to .008 inch will be enough. Use a very sharp-pointed side tool to prevent chattering.

As a further aid to avoid chatters, it is a good plan to suspend a weight (about twenty pounds) from the bearing next adjacent to the one on which the cut is being taken, using a belt lace as a means of suspension.

The next thing is to prepare the bearings for scraping. There are many things to be taken into consideration when fitting the bearings, and it is well to remember that proper preparations will take one a long ways towards good results.

The proper mesh of the gears is of great importance in turning out a quiet engine, and if the gears are loose it requires more metal to be scraped out of the top bearings than the bottom; if, on the other hand, the mesh of the gears is correct, or too tight, it will be necessary to insert a shim between the upper half bearing and the case in order to provide sufficient metal to scrape out and make a proper fit on the shaft.

If a shim is inserted, as described, the edges of the brass must be filed flush with the case. Clamp the brass into the case when filing to insure its being properly seated, using for the purpose small "C" or parallel clamps.

If shims are inserted between the brass and the case it is a good plan to allow them to make the complete half circle. But, as this makes a great amount of scraping on the sides of the bearings necessary, it is customary to graduate the width of the shims, putting the narrowest in the center and working up to the wider ones. If this is done, it is advisable to sweat them all together, and sweat the combined lot to the brass, thereby preventing them from shifting.

The ideal way to scrape in a shaft is to remove shims, or file caps, or pack under the bearings, as the case may be, a little at a time. At all times bolt the caps down tightly, and also allow the shaft to be turned with the freedom desired for the completion of the job. This is a slow process, but insures the mechanic against the loss of the bearings when the job is nearing its finish.

Reading the prints for alignment is rather difficult to describe in print. In considering a three-bearing shaft we will call the front bearing No. 1, the center bearing No. 2, and the rear bearing No. 3. If the print is light in No. 2 and heavy in No. 1 and No. 3, reading the upper half, scrape No. 1 and No. 3, and probably the cap of No. 2, which will show heavy if these conditions prevail.

If the print shows light on one side of No. 1 and the opposite side of No. 2, scrape the heavy sides of both bearings, but leave a little at the upper edge to crowd the shaft over. This must be done with judgment, so when the job is finished there will be no crowding of the shaft, as this will cause disalignment.

In removing shims and taking up bearings by removing the lower half of case, the mechanic must be guided wholly by conditions. If the engine is in fairly good shape this method is undoubtedly permissible.

It must be remembered that the constant tendency is for the shaft to wear out of alignment, and after doing the job in this manner a few times it will be found that the "knock" disappears for a shorter period each time. The only remedy, then, is to align the bearings properly.

In scraping the high spot, it is best to rub off the excess "blue;" the spots will then show to their actual extent, and not mislead the mechanic into doing scraping where it is not needed. Take care not to fit the shaft too tightly.

In no other branch of mechanical work are such liberties permitted to be taken with bearings that are required to be in perfect alignment as in the automobile repair business. Consider the manufacture of machine tools, for instance. A lathe costs, we might say, $600. The builder spares no pains to secure perfect alignment, using for this purpose accurately ground lining bars, sized discs and carefully graduated sweeps, the entire equipment

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costing many times the price of one lathe. An automobile costs from $500 to $10,000, and yet we turn a supposed mechanic loose on the job with a socket wrench and an old file made into a scraper (which makes a good one, by the way) and wonder why we don't get good results.

Forethought and care in scraping bearings will add greatly to an engine's silence and power qualities.

Four Suggestions for Christmas

Whether Young or Old, You Can Make Something for the Family Machine as a Christmas Gift for Father.

BY F. L. ALLEN

THE youngster, or even the twelve-year-old, who is attending school where manual training is taught, always has an idea that he must make something for Christmas for each member of the family. He, too, can make this Christmas an "automobile celebration." There are many things that the young fellow who is even an amateur at tools can make, and we are giving a number of suggestions for him in this article.

Before we give any descriptions, let us make one suggestion that the writer has found of great importance. The suggestion is contained in two words, "cigar boxes." One has no idea how many things can be made from cigar boxes, not from the boxes themselves, particularly, but from the wood that is contained in them. With a little careful practice using a saw, a cigar box, some glue and clamps, the amateur can make boards two inches in thickness and any width.

The joints where the cigar box boards are butted together will barely show if a very fine saw is used. If the amateur has not had experience in joining, he can obtain this experience in about two hours by cutting off short pieces of the thin wood. This wood is much easier to work than ordinary. In cutting thin wood of this sort the amateur will find it best to place the square upon

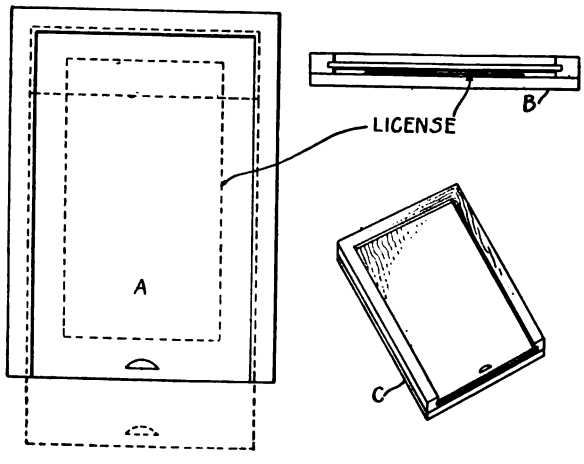


Fig. 1.—A Handy License Carrier.

the piece of wood to be cut and use the square to guide the saw.

An old letter press makes an ideal clamp for holding the pieces while they are being glued together. Any of the articles illustrated in this article can be made from two pieces of cigar-box wood glued together. In some cases a finer effect may be obtained by gluing thin frames upon a large piece of flat board.

A License Carrier.

In Figure 1 is shown a handy device for the automobile. If you have ever been with father when a traffic officer held him up you will know how embarrassing the situation was. Father hunted through his pockets, under the tonneau seat, in the tool box, and back of the cushions for his registration card. Probably he found it folded up in a little ball in the tool box, discolored by oil and with its corners torn off.

It might have satisfied the traffic officer for the time being, but with this treatment the license card grew no more legible. Why not have it in a place of its own? An easy enough matter if you make a license holder as shown in Figure 1. Upon a flat piece of cigar-box board about one inch larger in each dimension, as shown at B, than the license, make a frame from three thin pieces of wood. The middle piece of this frame is slightly narrower than the top and the bottom pieces, so that a groove is left in which the cover A will slide.

The cover A is nothing more or less than another piece of cigar-box wood of its original thickness. The license can then be pasted to the board B and the whole screwed beneath the seat or behind a cushion. The cover will protect the license at all times, while the license can be inspected very easily.

If the device can be placed somewhere where there is no danger of breakage, such as beneath the seat above the gasoline tank, then the cover A may be made of glass, and since it need not be removed to show the license, a thin piece of board may be tacked over the end to hold the glass in place. Do not glue this last piece of board in place, for the reason that as the license is renewed from year to year it must be pasted over the old one.

Light Bulb Box.

A tool box is usually a catch-all for everything. In it may be found everything from cotter pins to 24-inch Stillson wrenches. Very frequently the automobilist carefully places headlight bulbs in one corner of the tool

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box, possibly surrounds them with a strip of old newspaper and expects to find them in good condition when his headlight bulbs go out some evening. He usually finds them there—that is, he finds the pieces of the globes there and all of the glass, but not in the same condition as they were when he purchased them.

He usually collects the glass with a teaspoon or digs it out with his fingers. It is an easy matter to prevent bulb damaging by providing a box especially designed for the bulbs. The box should be screwed to the upper part of the tool box, out of the way of the rest of the tools, and in such a position that the heavy articles cannot hit against it and break it.

Make an ordinary box slightly larger than necessary to hold a set of bulbs, consisting of two headlights, two sidelights, a tail light and a clock or instrument light. Now into this box build a partition, as shown at D. In it bore the six holes for the light bases. The lights will jar out of place very easily unless some means is had for holding them in place.

A piece of spring brass wire should run across beneath

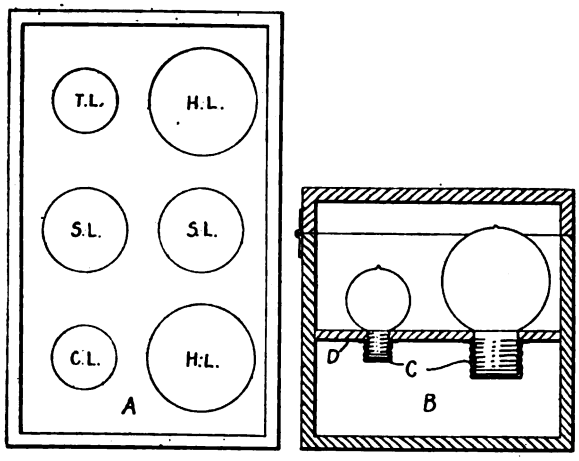


Fig. 2.—Light Bulb Box.

the partition so that it overlaps each holder about one-quarter of an inch. When the light is slipped into place this brass wire will press against the base and hold the lamp so that it will not jar.

Every accessory store sells special receptacles, as shown at C, which may be screwed beneath the partition if the spring brass wire is not available. Both of the devices spoken of are illustrated in Figures 1 and 2 and may be painted to match the car. The inside should be shellacked to keep out the moisture and prevent them from warping.

Keeping Spark Plugs.

A device shown in Figure 3 is another easily made accessory which every car owner should have. It is intended to hold spark plugs and is made from a heavy block of soft pine and cigar box boards. The heavy piece of pine board should be drilled with four large holes to hold the bases of four plugs. Do not drill the holes too large. Try to have them about 1/16 of an inch smaller than the outside diameter of the threads, and screw the spark plugs into them by means of a wrench. In this way the plugs will be held very tightly and there will be no danger of damaging them because of their jarring around.

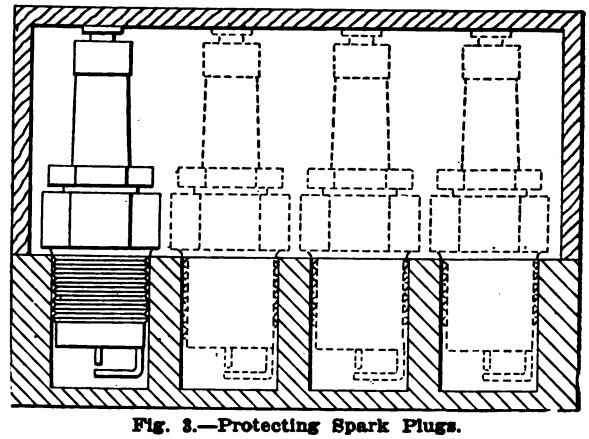


Fig. 3.—Protecting Spark Plugs.

If father's car is not fitted with a clock on the instrument board, a very acceptable gift along this line can be made for him, as shown in Figure 4. This device also can be made from cigar box wood. Each corner, however, should be reinforced by having a small piece of wood glued into it. This piece of wood is omitted in the diagram in order to simplify the sketch.

The face of the fitting, as shown at A, should be slanted somewhat if the dashboard is straight and is put into place last. B should be made of spring brass about 1/16 of an inch thick and bulged outward slightly in order to keep the watch from rattling. Be sure to obtain a watch that can be wound and set through the stem. Otherwise the face A will have to be removed every time the watch is wound or set. This last device should be finished the color of the dashboard, and it is well to add a word about finishing cigar box wood.

Staining the Wood.

Diamond dyes make an exceedingly good stain for coloring wood to practically any color desired. Diamond dyes for wool should be used in all cases and mixed with

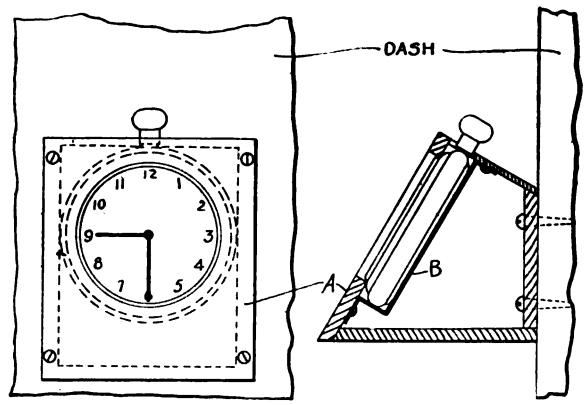


Fig. 4.—Dash Board Watch Carrier.

alcohol. For staining wood mahogany the colors old rose and brown are used and mixed in separate solutions.

Always stain the article slightly darker than it is finally intended to be, using first the old rose stain, then the

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brown. Do not be afraid to leave streaks in it. As a matter of fact, try to leave a number of dark brown streaks with the brush. Then shellac it with a very fine coat of orange shellac. After this coat is dry smooth it with pumice stone and oil and apply about six coats of shellac.

Before the final coat is applied, repeat the smoothing operation so that the last coat will be smooth and shiny. If a dull stain is desired the last coat of shellac may be rubbed with a little pumice stone and oil, very lightly. The result will be a dull mahogany finish that will have as good an appearance as a costly mahogany piano.

Some Helpful Hints from Ohio

A Number of Interesting Suggestions From the Middle West About Automobile Care and Repair.

BY JAMES F. HOBART, M. E.

THE appearance of the nuts on some automobiles are often a pretty good indication of either the skill or the knowledge of the man who takes care of the machine. A repairman in an Ohio garage recently told the writer that he was pretty apt to judge the owner or the operator of an automobile by the appearance of the nuts which required removal frequently.

"When I find the nuts all chewed (see A, Fig. 1) with the corners torn off," said the garage man, "I make up my mind that the man who takes care of the car is either a lazy chap or that he does not know his business. There are so many wrenches to be had nowadays which will fit any and all nuts perfectly, that there is no excuse for a machine coming into the shop with half the nuts looking as though they had been run through a stone crusher.

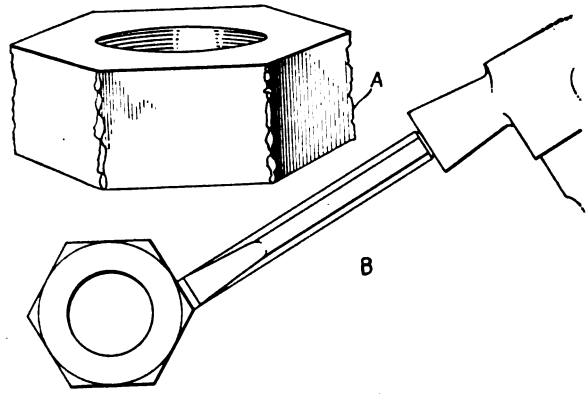


Fig. 1.—Turning Nuts with a Cold Chisel.

"The use of a too large wrench will damage a nut, but the bad habit of turning a nut with a cold chisel is responsible for most of the 'chewed-up' nuts which are found in automobiles. A nut in a pretty bad corner may be removed or tightened by means of a cold chisel and hammer, as at B, Fig. 1, but it does neither the nut nor the bolt any good and frequently has a bad effect upon other and adjacent parts of the car. There are stresses, sometimes, set up in bolts by the use of a cold chisel for loosening nuts, which weaken the metal of a bolt and sometimes hasten a sudden failure of the metal through crystalization.

"There are times when it may seem necessary to use a cold chisel to remove a nut, but it is NEVER necessary to use a cold chisel to replace any nut in any car, for the garageman who is fit to overhaul cars will have provided himself with the necessary wrenches for replacing ANY nut in any car. If he cannot buy such wrenches, then he should MAKE them, and make them before he puts that car together again!"

"I never screw on badly worn nuts when I overhaul a car," remarked the garageman. "All the worn and 'chewed' nuts go into the scrap box and I put new nuts in their places. The appearance of the overhauled car is far better with new and perfect nuts on the bolts. Just try it on an old car once, and see how the new nuts improve the looks of things."

"Alligator" Wrenches.

"One very vicious practice which is never tolerated in my shop is the use of 'alligator' wrenches for removing nuts or spark plugs. I will never allow a workman to put an alligator wrench upon any piece of metal which has been squared to receive a wrench. The only purpose for which the 'alligator' is tolerated should be for holding round sections, as at C, Fig. 2, to which an ordinary wrench cannot be applied. Keep this in mind when an alligator wrench is taken in hand and the car will look nicer, the nuts hold their corners better.

"Think I'm a bit 'cranky' on alligator wrenches? No, sir! I'm not! Why, I worked for one man, and a good mechanic he was, too, who wouldn't allow an alligator wrench on the job. He warned all his men, and he had several, to take the wrenches of that character home and keep them there.

"But one day he came across a big eight-inch alligator wrench lying on the floor beside a machine which was under repair. The 'Old Man' never said a word to anybody about that wrench. He just picked it up and gave it a heave out of the window into the river which flowed close past the shop. That settled it. I never saw another alligator wrench in that shop."

"It does get past me," recently remarked the owner of

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an automobile repair shop about 100 miles south of Cleveland, Ohio, "why users of motor trucks will not 'wake up' to the fact that adequate service repairs are not just as necessary to the motor truck as to the automobile. But, somehow, the truck users do not yet seem to have been educated to the understanding possessed by the better class of car drivers.

"There are still a few automobile drivers, principally 'tenderfeet' at the game, who drive around in animated

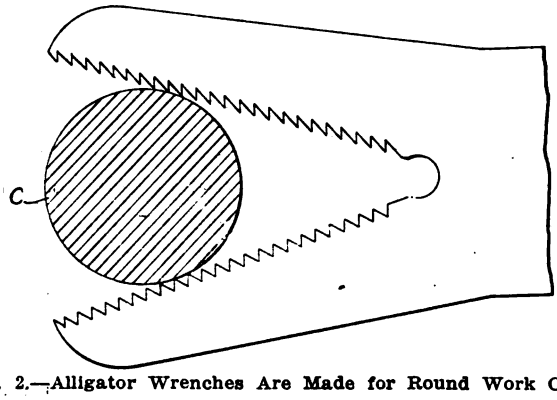


Fig. 2.—Alligator Wrenches Are Made for Round Work Only.

scrap heaps, with noise coming from each and every bearing and connection. But such vehicles are the exception, rather than the rule, for automobile drivers have learned the lesson that noise means wear, and that their car will not last as long when allowed to rattle and thump, as when everything is kept snug and tight.

"But the small truck driver and perhaps owner, has apparently not yet found out this great truth, so he lets the noise go, seemingly caring nothing for anything save that the truck 'will run' and that he can do his daily work with it. It is for this reason that so many light delivery trucks—converted automobile passenger cars, most of them—are running about the streets in such an offensive rattle-to-bang manner. Their owners or drivers are not yet wise that they are wearing out their cars twice as fast as needs be done just because of the needless rattle and pound.

"But the motor-truck-using people are waking up to the fact that a truck, like any other machine, must be kept in good mechanical condition if it is to be kept out of the scrap heap. A good deal of my time is freely given to the education of truck drivers; trying to show them that they are unnecessarily reducing the mileage of their converted delivery machines by not keeping the bearings and connections free from thump, noise and pound.

The Time Is Well Spent.

"Yes, I spend a good deal of time in that way, take it all together; but let me tell you, sir, the time is mighty well spent, for it brings me in large and direct returns. I believe that each hour which I have spent with truck drivers and owners, preaching to them the 'gospel of repairs in time' has brought into my shop a day of profitable work for myself and my help.

"No, I didn't say 'my men' for I haven't any men in the shop. Can't get 'em, either. About all the auto repair men are 'over there,' and I would be with them were I 20 years younger. I have to get along with one man—got a bad leg, you know—and a couple of girls. And say, they are all right too. At first they were a bit 'finicky' about getting next to dirt, grease and slush, but since they have really found that grease and grime can be washed off same as can the dirt from pots and kettles, these girls have gone right down into the 'reason why' of automobile repair matters and will do as well as men as soon as they have had as much experience.

"Tell you what—I believe there are not many things in the mechanical line which some women can't do as well as some men, provided they have the same incentive to, and do take as deep an interest in the things to be done.

"Just as soon as the woman in factory or garage realizes what there is in mechanical matters for her, she will be as keen to go after those things and to understand them from A to Z as any man. It makes a woman mighty self-respecting and self-reliant too, to get a bit of mechanical knowledge and experience. Seems to have opened a new world to her, which she enters with great pleasure and profit. Yes, I said SOME women, and you will also find that I said 'some' men, too!

"Autorepairettes!"

"They like the work, too," continued the garage owner. "The other day I heard them talking as one was under a car disconnecting the rear axle and the other girl was taking out the valves preparatory to regrinding.

"One girl said to the other, 'No, Mary, I won't give

NAME OF TIRE CO.

RECEIVED	TIRE No.	SOLD	NAME AND ADDRESS

Fig. 3.—A Handy Tire Memorandum Form.

up this business when the war is over and the men come back again; why, this is real work. You never will find me behind Woolworth's counters any more. I shall stay right in the automobile repair business!'

"'Yes, Jenny,' the other girl replied, as she loosened a refractory plug, 'And you will never see me doing embroidery or crochetting again after finding out how very much there is in this work which is so interesting!' "And then," said the garage man, "I called both the girls to

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slip a couple of inner tubes into the rear wheels of the car of a society lady who sat in her car while the work was being done, and, bless me, if I don't believe that dame got so interested in the work that she will be over here soon, wanting to put on overalls and grease and get right into the work herself—blamed if I don't!"

"You're a 'Clutch-Rider'!"

Some pretty loud talk over in the corner of a little repair shop in Central Ohio attracted the writer's attention, as he chanced to be standing in the doorway looking into the shop. The voice of the repair man rose loud and clear as he "bawled out" a customer thusly. "Yes, I mean just exactly what I say; you're a bloomin' clutch rider, and that's what's the matter with your automobile clutch, and all that's the matter with it too!

"You always drive with your foot on the clutch lever, don't you? Yes, I know what you would say, that your foot barely touches the lever and never puts any pressure on it, but that is not so. Your foot does put some pressure on the lever and that pressure is transmitted to the clutch mechanism. Your clutch is a cone, and here you see, the facing is badly worn, the thrust bearing is nearly worn out and you come in with the complaint that the clutch was slipping!

"Sure the clutch slipped! How could it help slipping under all the abuse to which it has been subjected through continuous pressure on the lever from that foot of yours? If you want the clutch to stay in good condition, quit riding on it. Keep the foot off the lever and then there will be no trouble. But just as long as you play the bluejay act, and drive with the 'longest toe behind' resting upon the clutch lever, then just so long are you going to have these same clutch troubles and perhaps get smashed up through failure of the clutch to hold during a sudden stop. No, my friend, 'clutch-riding' is bad. Don't do it!"

"What have you got there?" the writer asked of a repair man who was entering some figures from a pad upon one of the cards in a neat catalog case.

"Oh, that is my serial tire numbers. Some time ago I started to keep a record (see Fig. 3) of each tire through the serial number which is embossed on the body of the tire. I put the name of the tire manufacturer at the head of a card, then down the left side I leave room for my dating stamp, and then I put the tire numbers in a row with the date before each number, which tells when the tire came into my possession. Then when a tire is sold I stamp the date of the sale after the number of the tire sold, and after that date I write the name and address of the customer who purchased the tire, or, if I do not know his name and address I set down the license number of the car which was fitted with that tire.

"Handy? Well, I should say so. It is sure a 'dead give away' when a car has been stolen and one of those tires is found in the hands of a junk dealer. And it is very handy too, when a tire goes bad before it has made the mileage claimed for it. The manufacturer hasn't a word to say when you fire at him the serial number of the inferior tire. Then he has to get right down to the 'box of brass tacks' and dig out the reason for the failure and—pay for it!"

Marking Valves When "Grinding-in."

Some repairmen, while grinding-in valves, use red lead mixed with oil for a smear with which to cover lightly the business edge of a valve in order to know when it has been ground to a perfect bearing. The pigment should be mixed very thoroughly and evenly. No lumps or bunches left in the mixture. Then when used a very small amount should be taken on a finger and very thinly spread very evenly over the entire working surface of the valve.

Don't spread the color thick in one place and thin in another, spread it evenly, then place the valve upon its seat and revolve in the usual manner, and spots of red left on the surface indicate low places which need further grinding of the valve in order to bring the rest of the valve surface down to the level of the parts still covered with pigment.

Some repairmen prefer prussian blue mixed with machine oil, instead of red lead and oil. They claim that the blue color is easier seen than the red. Some repair shops use no pigment at all, letting the discolored portion of a valve show when the grinding had not proceeded far enough. But I saw one Ohio garageman work a real cute "kink" in this direction. Instead of bothering with a dirty, sloppy, spilly paint, of any color, this chap simply carried a very soft black lead pencil in his pocket and used that instead of paint. He rubbed the pencil lead evenly over the valve, and then ground all the lead off, and that was all there was to the operation.

FILLING CYLINDER SCORES.

For a Few Cents the Automobile Owner Can Put Back the Pressure in Compression and So Restore the Power of His Engine.

By AN OLD SALESMAN.

WHEN I was in the automobile business I had occasion to dispose of used cars in various stages of disrepair, and like many other used-car dealers (and horse salesmen, by the way) I was inclined to "doctor" my goods so that the machine would work at its best while it was being demonstrated.

Now do not make a mistake and think that all dealers in used cars try to swindle their customers by misrepresenting the cars which they are selling, for they do not. I was one of the exceptions who did try to dispose of cars under the old maxim of "Let the buyer beware." This is not intended as a confession, but as a suggestion for the readers of the AUTOMOBILE DEALER AND REPAIRER magazine.

Scored cylinders and poor compression are two of the things that always bother me most. The average automobile owner or would-be purchaser knows that an

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engine with a poor compression indicates a car that has little power, and he is right, but he little realizes what good compression represents in dollars and cents.

To restore the compression to normal by ordinary repair methods usually means a cost of from $25 to $75, depending entirely upon the engine and the condition of the cylinders, and if the dealer cares to dispose of a car at a reasonable profit he is not in the humor to spend this amount. He is forced to cut the price of the car greatly or take some other means for restoring the compression.

Let me whisper one word in your ear, "graphite." I see by your expression that your mind is still blank, yet I have given you the full recipe for saving at least $25 in most cases. Let me explain more fully. We will assume that your engine has been damaged by having its cylinders scored. Three of the cylinders are in good condition. The fourth, however, has little compression. Its action is uneven and its power greatly impaired. If you understand my little article, immediately you discover this fact you will start the engine and slowly feed into the carburetor a few teaspoonfuls of flake graphite.

After you have done this, you will let the engine run for a few minutes until the excess graphite has been driven through the manifold, then you will remove all of the spark plugs and clean them thoroughly with gasoline. As soon as you replace them you will find that the lost compression has been found. Probably the score has been filled by the little particles of graphite and it is very possible that the score will remain filled for many weeks at a time. The cost has been less than one cent and the repair has occupied possibly half an hour of your time, yet you have an engine of four cylinders rather than a bunch of iron that has only three working units.

SHARPENING THE SCREWDRIVER.

By CHAS. E. DURYEA.

EVERYONE knows how to sharpen a screwdriver, of course. This well-known tool is so common that every mechanic considers it perfected and never gives it a thought, while others give it no attention at all. The result is that too often it resembles a cold chisel rather than a device to fit screw heads and turn them.

Assuming that whatever is, is right, does not speed progress. A much better way is to adopt the rule that whatever is, may be the best there is, but can almost certainly be improved. If anyone doubts this, let him look back ten years in memory to the things he thought perfected then. He will find many of them discarded now.

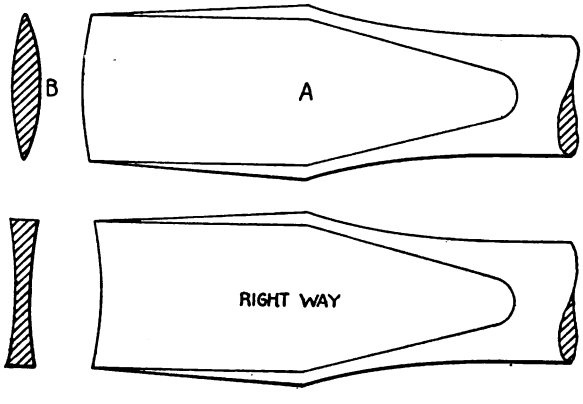


Fig. 1.—Correct and Incorrect Screw-Driver Shapes.

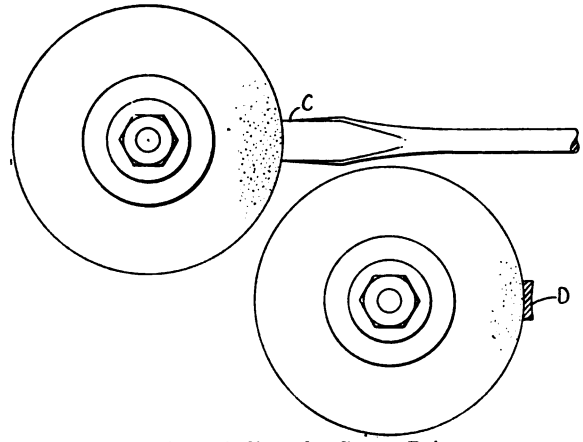


Fig. 2.—Grinding the Screw-Driver.

The following method of grinding screwdrivers must be evident to many, but I have never found it used in but one shop besides those under my influence. It is simply to hollow grind, and a hollow-ground screwdriver is as much better for screw turning than the flat kind as a hollow-ground razor is better than a case knife for shaving.

The screwdriver wears in use at the corners until it gets a curved point, as at A, Figure 1, and a cross-section, B, near the end looks like a section of a simple magnifying lens. Evidently one should grind away the metal where it does not wear away and leave it where the wear comes.

This is easily done by holding the blade in the plane of the wheel instead of in the plane of the axis, and extended radially, as at C, Figure 2, when grinding the end, and when grinding the flats to hold it parallel to the wheel (as at D) spindle instead of tangental to the wheel.

The result is a driver that will hold, in screws, to the limit. It will not split screw heads, for it has no wedging effect. It will drive round or button-head screws without marring them, and it goes to the bottom and gets a full grip in the notch. Once use such a driver and one is not likely to ever prefer the usual shape.

If you like this magazine and feel that it is useful and interesting, the *one best way* to show your appreciation, is to purchase your accessories and supplies so far as possible from our advertisers. Also write to our advertisers for catalogs, printed matter and prices, not forgetting to always mention the fact that you saw the advertisement in the Automobile Dealer and Repairer.

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Letters From Red Blooded Americans

While Our Boys Are in France, Driving Out the Murderers, Our Manufacturers Are Furnishing the Money and Material.

AMERICA has finished what she started nineteen months ago and has shown that God *is* with those nations who have enlisted upon the side of Humanity and Justice. She has *won* the good fight because she has remained UNITED. She did not win only because of the soldiers, solely because of the workers, because of much money, or just because of the supporters at home—but because *all* of these units worked as one.

We mourn those who died in battle; we revere our boys, who have fought so well, and we respect those thousands of willing workers without whose help we would have been unable to win.

America will never forget the fighters; you and I, brother reader, will never cease to honor the brave men who put on khaki and crossed the ocean; but how soon will we forget the manufacturer, who came forward in our hour of need, put his shoulder to the wheel and devoted, yes, perhaps ruined, his business in order that the hun might be conquered?

Are we so ungrateful that we will desert our countrymen? Are our hearts so filled with the greed for money that we will turn our backs to the products of our own loyal manufacturers and seek those goods made by men who only a few days ago were our enemies?

You, brother reader, can give the answer to these questions. Perhaps you have answered them already in your own heart. If you are a loyal American you need no argument, you will not heed the soft and wily words of the enemy, when he tries to ingratiate himself and his blood-stained goods into your heart and your homes. Let the words "Made in Germany" be written in Blood upon your brain; they are written in blood and ruins on the soil of France, on tortured Belgium and even in germany itself.

Are you a Patriot or a Traitor?

Below we give portions of letters received by us in response to an appeal, "What have you done, Mr. Manufacturer, to help win the war?" We pass the answer along to our subscribers. Read how they have helped YOU, then read what the huns have done, on the next page, then think it all over.

Barnes Drill Company.

"We are running 100% in behalf of 'Liberty and World Democracy.' In other words, our output of high-class, all geared drilling and tapping machines and extension gap lathes are being built and sold exclusively for essential purposes, and deliveries made on Priority Classification basis."

Curtis Pneumatic Machinery Company.

"We are giving preference, of course, to Government work and to calls from essential industries."

Crescent Machine Company.

"The entire output of our factory is going for Government and essential uses."

Anti-Borax Compound Company.

"We are filling large orders for welding and brazing compounds from our Government. We have lost a number of our men who have joined the colors, but are perfectly willing, and are making every sacrifice possible to help make the world safe for democracy."

Hinckley Machine Works.

"Our work in helping Uncle Sam to win consists in making parts for howitzers, and we are working 90% of our time in this line."

Weaver Manufacturing Company.

"Since the United States entered the war various Government cantonments have been using our equipment. Recently we turned over a part of our factory to ordnance work."

United States Air Compressor Co.

"Ninety per cent. of our factory has been turned over to the United States Government, building the air-compressor units to be shipped overseas."

Hudson Motor Specialties Co.

"Some months ago we donated to the Quartermaster's Department, for use in connection with the Ford Ambulance Service abroad, 100 Hudson Crank Case Repair Arms."

Joseph N. Smith & Company.

"Our factory is operating on approximately 80% Government work and our facilities have so far adapted themselves to the manufacture of parts for the Government that we have not had to revamp the factory."

Du Pont Fabrikoid Company.

"We are not permitted to speak of many ways in which the Du Pont Fabrikoid Co. is co-operating with the War Department, but we can say that we have been supplying Fabrikoid as a substitute for leather for upholstery in practically every place where the Government has need of an upholstery material."

The Reflex Ignition Co.

"Our Government orders, which are being done on a sub-contract basis, constitute approximately 60% of our plant, and we are planning to keep more than 50% of our machines on Government work during the period of the war."

WILL YOU BACK UP THOSE WHO HAVE MADE VICTORY POSSIBLE? PROVE IT!

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Mr. Purchasing Agent It Is Up To You

Are You Going To Buy Goods From Red Blooded Americans or Will You Buy From the Butchers After the War Is Over?

ON the page facing this article our readers will find excerpts taken from letters written by many prominent American manufacturers—manufacturers who, when the hun was doing his best to wreck the world and enslave the nations, put forth their efforts to save America and make sure that justice and right should not be trampled under foot.

To these manufacturers we owe our allegiance. To these men who have devoted their factories to war work we should now show our appreciation, and we can show our appreciation best through our acts, not by words.

You may call the german all the names in the calendar. You will not hurt his feelings one bit. You will not punish him in the least; but, when you begin to affect his commerce and his business, then, my friends, you are using a weapon that *will* punish him.

"Mr. Buyer, this article is addressed particularly to you; and you, Mr. Reader, are the ultimate buyer of goods, therefore it affects you also. In the next ten years you will be called upon to fight a commercial war. Are you going to stand behind our American manufacturers who can put out goods superior to those made by germans, or are you going over to the side of the enemy? Are you going to let your pocketbook rule you? For many of the following quotations we are indebted to an article written by R. F. Soule of the *Hardware Age*.

* * *

"The other night one of Pershing's boys went out into No Man's Land. He did not come back. Three hours later a searching party had been sent out to find him. That boy had been killed and his body hacked to bits. That brave young American was chopped to pieces with german cutlery.—Before the war we bought two million dollars' worth of german pocket cutlery each year.

* * *

"A captured British officer was recently found with his throat cut from ear to ear. This brutal job had been done with a very keen-edged instrument.—Before the war we imported annually half a million dollars' worth of razors from germany.

* * *

"Two Canadian Red Cross nurses outraged, their hands chopped off and their tongues cut out that they may never tell the hideous story of frightful wrongs perpetrated upon them.—Before the war we bought 600,000 dozen shears and scissors from the Central Powers annually.

"A short time ago the Llandovery Castle, a Red Cross hospital ship, was sunk by a german submarine. Its only passengers were doctors and nurses. It was plainly marked, there was no chance of mistaking it for anything but a hospital ship. The germans torpedoed it, took American doctors from their open lifeboats and abused them.—Before the war we imported from the central powers practically every surgical instrument used in America.

* * *

"Imagine a postal card telling that your son had lost his third finger, deliberately cut from his hand that a hun might be possessed of the ring he wore. Imagine a postal that tells of the women and children at Mons who were forced to march on their own soldiers, acting as a screen for german troopers. Read that the fifty who refused were bayoneted.—Read, and calm yourself of the statistics that inform you that before the war we purchased souvenir post cards and lithographs from germany to the amount of nearly two million dollars annually.

* * *

"Music outraged. Raise the curtain of Kultur ever so little, and peek at those villages of France and Belgium occupied by the invaders. Before your ever-widening, horror-struck eyes is an unearthly panorama of encouraged lust. Villages burning everywhere, the streets strewn with the viciously flung bodies of the helpless inhabitants. From a house before you come the terrified shrieks of a young girl who is being outraged. Suddenly the door of this house is burst open and an old man is hurled into the street. It is the grandfather of the girl whose screams make your blood run cold. He is seventy-five years of age, and has gone to her rescue. As the forcefully impelled body of that courageous old gentleman strikes on the cobblestones, the crowd of half-drunk soldiers, on whose belts you see inscribed "Gott is with us," begin jumping with fiendish glee upon him. Their heavy, hob-nailed marching boots quickly reduce his frail old body to a battered, bloody mass.

"No, Mr. American, these are not hallucinations of your own imagining. They are actual sights made hideously clear by burning buildings which are being wantonly destroyed. Then you see a load of straw on a quaint two-wheeled cart coming down the street. It is stopped. Oil is thrown over it, and in its highly inflammable state the willing hands of the huns throw it into a cellar where a large number of women and children have taken refuge. And then, merciful God, a laughing

DO YOU WANT TO FURNISH MONEY FOR A FUTURE WAR AGAINST AMERICA?

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soldier of Wilhelm, the Brute of Berlin, scratches a german-made match and one more absolutely inhuman atrocity has blotched the historical page of a couple of nations whose thin veneer of civilization has been scraped away in a war that is but a few days old. Where? Well, the name of the town was Charleroi.

"And from up the street came the sound of outraged music from stolen gramophones, accordions and a pianola. The officers were singing. A musical entertainment in celebration of a victory.

"Before the war, musical instruments, gramophone motors, player pianos; yes, we bought a lot of them from these twin nations of rapine. After the war? In the name of the angels who sing saddened music in heaven as they look down upon music outraged, no more musical instruments from germany and austria.

* * *

"In a recent speech John Kendrick Bangs said: 'I want to tell you what the hun is doing, tell what kind of an enemy we are up against at the end of four years. Six weeks ago I held on my knee a seven-year-old lad who was playing in a village that had not been bombarded. Then the huns dropped a bomb from the aeroplanes and killed some of the old men and women in his town. After they had passed the child was allowed to run out and play. On the road he found a toy. One of these toys we used to get at our children's parties with fancy caps and verses in them.

" 'He took it up as he was intended to do; he thought it was a toy, as it was intended that he should; then he tried to break it apart, as was also intended that he should do. Five hours later, when that little fellow regained consciousness, there was only one finger left on his hand. All the rest had been blown to pieces.' "

* * *

Mr. Buyer and Mr. Automobile Owner, who is really the ultimate buyer of all products, despite these damning facts, are you going to purchase german-made articles? Can you buy a german toy without thinking about that little boy? Think of your own boy mutilated in that same way. Is it pleasant? Is it worth while?

Can you go home and eat food prepared in german-made enamel ware without recalling the atrocities committed upon the Belgium housewives and their daughters?

Can you go to a dentist and let him work upon your teeth without thinking of the prisoners whose blood has been poisoned and their bodies mutilated by german-made instruments?

Can you wear a suit of clothes dyed with german dye without thinking of the black spot which germany has left upon the face of Europe?

Can you write your name on a post card without seeing the hun's red splotched hands upon it, and stamped "made in germany?"

Before this war germany said that she could make dyes, instruments, tools, clothing and thousands of other products better than the American manufacturer.

Her truth could be proven from America's import list. She said that she could make WAR better than anyone else. *We have proven her wrong.*

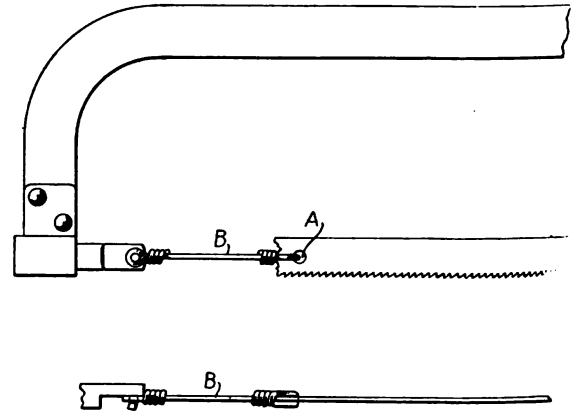
Let us continue our proof and show that Americans can manufacture and produce all products better than germany. Let us prove that we as Americans cannot only fight better but live better than germany.

We backed up our war with our pocketbooks. That is why we succeeded. Do the same by our true and red-blooded American manufacturers who have stood by us in this fight. They have helped you and me, Mr. Reader, to win the war. Let us show our appreciation by helping them in the war that is to come.

USING OLD BROKEN HACK SAWS.

By CHAS. E. DURYEA.

IN these days of high costs and scarce material one should not throw away good stuff. If the end breaks from a new hack saw, as in the figure, make a hole, A, near the break and use in a shortened frame or splice



How to Utilize Old Hack-Saw Blades.

with a loop of wire, B. Do not spoil a drill trying to make the hole. Hold the end of the saw in the fire until it is red, prick deeply, and file or grind off the raised spot. This produces a hole which can be enlarged easily by reaming with the sharpened point of a small file. Clock springs can usually be perforated by the prick-punch and file method without softening.

Always use handles on files. Handles are cheaper than the same length of file. The handle enables the workman to work faster, easier and better. Longer strokes are taken and the file is worn the whole length. The worn-out file can be thrown away at the proper time instead of being saved because "some inches near the tang are still good." Corn cobs make fair handles if nothing better is at hand.

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THE TRANSMISSION GEAR-SET.

Changing Gears From Low to High Is an Easy Matter, but Few Drivers Can Change From High to Low With a Minimum Amount of Grind and Clatter.

By F. L. PHILLIPS.

I WONDER how many automobilists know how to change gears noiselessly? Stand on the corner some day and listen to the automobiles as they pass. Be sure to pick out the corner where the car must be slowed to a few miles an hour and the gears changed, and you will find that six out of every ten drivers make the change with as much noise as a steam roller running over a pile of crushed rock. They slam in the gears, speed up the engine and change gears into high with a crash.

At every change there is a great amount of gear noise, and this noise is not always due to the fact that the gears are worn, but usually because the driver does not know how to make the change properly. In the average sliding gear transmission of today there are two shafts, a main shaft and a counter shaft. The main shaft is made in two portions. The forward section connects directly to the clutch and is usually a large driving gear.

The rear section of shaft is fitted with two sliding gears, both of which are keyed to the shaft and drive the rear axle directly. The counter shaft is fitted with four or more gears, one of which is meshed with the driving gear and the rest are all keyed tightly to the shaft. As long as the clutch is in and the driving gear rotates, this counter shaft rotates with it and the counter shaft ceases to rotate only when the clutch is thrown out.

The sliding gears and the other three gears on the counter shaft are of various sizes and are designed in such a way as to offer various gear ratios for selection. Let us see what happens when a car is started.

With the engine running, the two sliding gears on the main shaft are at neutral—that is, neither of them mesh with the counter shaft gears. These sliding gears are stationary because the car is not moving, but the counter shaft gears are traveling at a certain rate, depending upon the speed of the engine. If either of the sliding gears were to be meshed with its corresponding counter shaft gear the teeth would be stripped from either or both of the gears, so the clutch must be thrown out, and when this is done the counter shaft ceases to revolve, then the low-speed sliding gear can be meshed with a gear on the counter shaft. In this ratio the gear on the counter shaft is smaller than the one that meshes with it.

The clutch is then thrown in, the counter shaft starts to revolve and drives the main shaft, thereby moving the car forward at low speed. When sufficient headway is attained it is desirable to change this low speed ratio for a lower ratio—that is, the low speed ratio gear must be slipped out of mesh with its counter shaft gear and the intermediate sliding gear meshed with its corresponding counter shaft gear.

As before, this operation cannot occur without damage to the transmission until the clutch has been released. As soon as the clutch is released the counter shaft is carried along by the speed of the car through the sliding gear, then the low sliding gear is slipped out of mesh. As soon as this occurs the counter shaft loses speed and it is time to mesh the intermediate speed.

Now the intermediate speed gear on the counter shaft is only slightly smaller than its corresponding gear on the main shaft. Therefore it can be meshed just as soon as the counter shaft speed slows to the speed of the main shaft. Since the tendency of the counter shaft is to slow down, its change can be made with but little noise. After intermediate speed has been attained the clutch is thrown out, and this same intermediate gear is moved forward, only it locks with the other portion of the main shaft or the driving gear. As before, the change can be made with a minimum amount of noise, for the reason that the driving gear has a tendency to lose speed and conform to the speed of the main shaft, which drives the wheels.

Few car owners fail to make the changes from low to high without an appreciable amount of noise. The real trouble comes when the driver desires to change from high to intermediate, or from intermediate to low speed, and the reason for this is, that when the car is running at high speed the driving gear is running at main shaft speed.

As soon as the clutch is thrown out the main driving gear loses speed, and if the intermediate gear is thrown in, a grinding noise results, because the intermediate gear ratio requires a faster counter shaft speed that is being developed.

In changing from high to intermediate, or to low, means must be adopted to speed the main driving gear and counter shaft at a higher rate than it would travel ordinarily. To make this change noiselessly the operator should throw out his clutch, change the gears to neutral and speed up the engine, let in the clutch for a second until the counter shaft has attained a high speed. Throw out the clutch again and mesh the intermediate gears.

In changing from intermediate to low, the same procedure must be gone through. Always bear in mind that only a second is required to bring the speed of the driving gear up as high as required. A tap with the foot upon the accelerator is usually sufficient. Do not, however, forget to throw out the clutch again, before meshing the gears.

The Call of Humanity
is "Join the Red Cross"

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Automobile Dealer and Repairer

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MISSING NUMBERS—Our readers are requested to remember that we are always pleased to re-send numbers which have gone astray in the mails.

Victorious Peace.

JUST as we go to press the news comes in that an armistice has been signed and that the great world war is over.

Ordinary words fail to express the jubilation justly caused by such a momentous event, the most important one in the history of all mankind.

The world has indeed been made safe for Democracy and Freedom, and in the immortal words of Abraham Lincoln it is decreed that "A Government of the people, by the people and for the people shall not perish from the earth."

This Christmas Number of our magazine is doubly appropriate, as we usher in a new era of "Peace on earth, good will toward men."

We do not need to wish our readers a Happy Christmas, as this should be the happiest Christmas this war-scarred world has ever known.



Prosperity and Plenty Are Promised For Next Year, Get Your Share of Business

FOR nearly a year now the manufacture of passenger cars has been cut from 25% to 75%. The normal sale of these vehicles has dropped necessarily a corresponding amount. The man who ordinarily has made a point of purchasing a new car from year to year has been forced to content himself with his old machine. It stands to reason therefore that during 1919 there will be a phenomenal sale of new cars.

The manufacturers in 1919 will find themselves face to face with the demands of two years rather than the possible demands for one year. There will come a great demand for automobiles both new and second-hand, a greater demand than ever before for this reason. It is a period of great prosperity. Never before has the working man been able to spend so much money. His first thought is an automobile. An automobile seems to be in the minds of every American a necessary possession as soon as he has money enough to purchase one. As a matter of fact there are many possessors of machines who do not have money enough to own them.

The prosperity which awaits the manufacturer, also holds out many promises for both the dealer and the repair man. More cars mean more work, and more sales. Every dealer should prepare himself for the coming golden future, plan as never before, and radiate the spirit of optimism.

The war is over and with it our worries as far as selling is concerned. What before was only a bud, bids fair to blossom the coming year, the seed is "the automobile" and the blossom "big business."

Why Not Plan to Have the Automobile Shows, if Possible, Early Next Year?

SOME few months ago the automobile world was agitated by the announcement that the automobile shows which ordinarily were held at Chicago, Boston and New York were not to take place this year. The automobile world realized that this was a war-conservation-necessity.

Automobile shows are not essential. They are simply a means of disposing of products and manufactured machines, and since the War Industries Board called for the cessation of automobile manufacturing plants, from automobile work, the apparent reason for shows ceased.

Since then, however, conditions have changed. It is true that we are bound to furnish Europe with a certain amount of material but the old saying still holds good that charity begins at home. Naturally we will furnish every product necessary for our Allies' trade reconstruction, but it must be remembered that the Allies can now mine plenty of coal and the Belgium iron fields are open to the European countries.

There will be a tremendous amount of materials re-

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leased at the cessation of war. At the end of this year or the first of next year, the coal situation will have been cleared up, and although there must not be a waste of materials in any line, the Government will undoubtedly do everything in their power to assist the manufacturers in resuming their old lines of business and putting the various businesses back upon their old basis.

It seems only logical therefore that some move be made for the reinstatement of the automobile shows. Automobilists, dealers and manufacturers should exert their influence toward this end. To the automobile business, an automobile show is not perhaps essential yet it is a great help. It enables the buyer to get in communication with the manufacturer. At the show he can make comparisons and obtain new ideas so essential for up-to-date business.

An automobile show is to the automobile world what a show window is to the dealer. It enables the manufacturer to show his wares and it enables the prospective buyer to get a line of what he needs or wants.

Next year, undoubtedly, will be a year of great prosperity for us. Our year will begin as soon as an automobile dealer has decided upon his line for 1919. The dealer usually begins his plans in January or February. Why not have our automobile shows as usual at this time unless it is found that they interfere with the plans of the Fuel Administrator or the War Industries Board?

To All Subscribers in Zones 7 and 8.

THE unfair and unjust raise in the rates of postage on second class matter, which by act of Congress went into effect July 1st, forces us to announce a raise in the subscription price of the AUTOMOBILE DEALER AND REPAIRER in zones 7 and 8 to $2.00 per year. These two zones comprise the following states: Arizona, California, Colorado, Idaho, Kansas, Montana, Nebraska, Nevada, New Mexico, North Dakota, Oklahoma, Oregon, South Dakota, Utah, Washington and Wyoming.

Our readers located in these distant zones may naturally feel some degree of resentment that their states have been discriminated against by Congress in this manner, thereby compelling publishers for self-protection to raise subscription rates.

We understand that many Representatives in Congress located in these far distant states voted in favor of the Zone system or in other words of imposing a heavy tax upon their constituents. All subscribers located in these zones should communicate with their Congressmen and demand that this act be repealed.

In all other zones than those mentioned above the subscription rate on the AUTOMOBILE DEALER AND REPAIRER will remain, for the present at least, $1.00 a year, as heretofore.

The Insidious Work of the hun Should Not Be Permitted After Peace Is Made

AMERICA has only lately awakened to the gigantic scheme of german propaganda, which has spread over this country like a monster net. So insidious has been the work of the hun that too great a percentage of American industries have been directly dependent upon germany for their goods or products. Such a mistake must not be repeated.

We must never allow ourselves to pay germany an indemnity in the shape of trade. Buy American products, purchase English materials or invest your money in goods from France or other countries, but do not let any of your money get into german hands.

Do not allow germany to "put her finger in your pie," for sooner or later that finger will stir it up and your business will cease to be American. It will be german controlled. You cannot put your hands around the neck of the kaiser, but you can throttle german industry in America. America is for pure, hearty Americans. It is the only country in the world where freedom is absolute.

You had your answer when you came to America, when you freed your feet from the soil of your foreign country you became an American. As soon as you accepted American money you became indebted to America. You owe America your allegiance and it is your business to protect American interests. After this war is over and we have stamped out the hun, let us all work together and push American goods to every corner of the earth. Let us make America a star among nations and spread our propaganda into every country so that even the boys in germany will wish that they were Americans.

In "Those Good Old Days" of Long Ago of Which the Old Timers Speak

THOSE who are compelled to pay the exorbitant prices charged now for meats of all kinds will be interested to know what meat cost seventy-five or eighty years ago.

The editor and publisher of this journal recently came across a bill for meat which was delivered to his father, Thomas Richardson, in 1832. One item is 6 lbs. veal at 4 cents—24 cents; another item is 5 lbs. beef at 6 cents —30 cents; 4¾ lbs. pork at 10 cents—48 cents.

In those good old times it did not cost so much to live as it does now, but perhaps the people of those days had just about as much trouble paying their bills because wages were low and hours long, and money not easy to get hold of.

The writer remembers when carpenters and other mechanics worked twelve hours a day and thought nothing of it. It was the regular thing.



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The High Tension Ignition Coil

The Average Owner Knows Little About the Common Induction Coil, Yet This Is a Very Important Unit.

BY GEO. W. MUENCH

IN over five years' experience teaching gas engineering I have found nothing more perplexing and less understood than the induction coil, unless it be the high tension magneto. This would, however, be natural, for not to

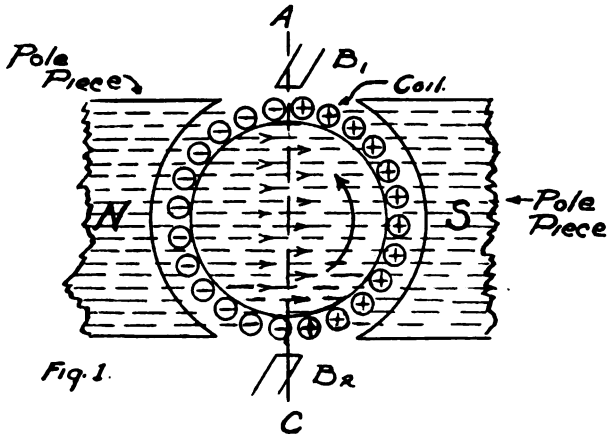


Fig. 1.

understand the induction coil means not to understand the magneto. It is of course necessary to understand the mechanical method of producing an electric current, as well as a few principles of magnetism.

Most gas engine operators are familiar with ordinary horseshoe magnets and they no doubt know that magnets have two so-called poles, called north pole and south pole. The magnetic lines of force travel from the north pole to the south pole as shown in Fig. 1. If a coil of wire now be moved so that it cuts the lines of force an electric current will be generated in the coil. This is the one mechanical method of producing an electric current.

If an electric current is passed through a wire the wire itself will be surrounded by a magnetic field. Now if this magnetic field be moved so as to cut a coil of wire, or the coil moved to cut the field, an electric current will be produced in the wire. This is the second method of mechanically producing an electric current.

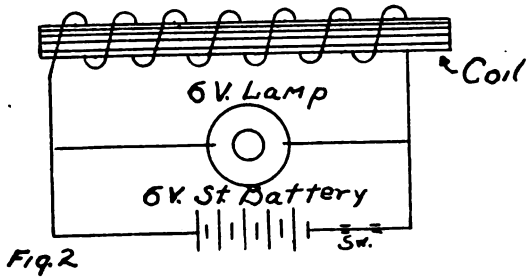


Fig. 2

In the induction coil all the above principles are made use of, only in a manner not so easily seen. It should be understood also that steel becomes only a fairly strong magnet, but retains its magnetism for a long time, whereas softer iron becomes a much stronger magnet, but loses it as soon as the magnetizing current stops.

It is this production of the magnetic field and its sudden collapse that does the work in an induction coil. If a six-volt lamp and six-volt battery be connected across a coil as shown in diagram No. 2 and the switch closed, the lamp will burn at normal brightness; but if now the

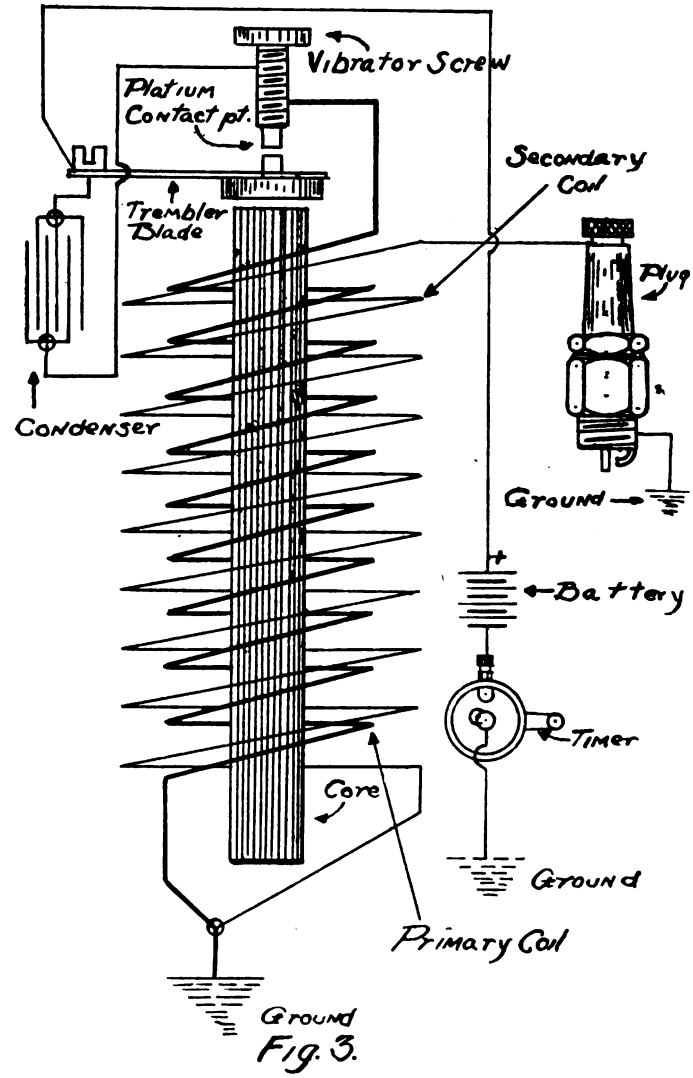


Fig. 3.

switch is suddenly opened the lamp will suddenly flare up. This is due to a new current being produced in the coil when the collapse of the magnetism, due to the opening of the switch, cuts the turns of wire of the coil.

This peculiarity is called induction. Now let us assume another coil in the vicinity of the first one; at the time of the collapse of the magnetic field this second coil would have an electric current produced in it as well as

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the one which at first carried the battery current. However, the pressure (voltage) of an electric current thus induced in coils varies with the number of turns, so by giving this second coil thousands of turns of wire a high voltage can be induced in it.

Fig. 3 shows the complete construction of a single cylinder induction coil with a battery connected to explain operation. The iron core first has wound over it a few turns of fairly heavy wire. This is called the primary winding. Over this is another coil of thousands of turns of extremely fine wire. This is the secondary. At one end of the core is placed a spring with a piece of soft iron fastened onto it, as shown in figure. Above this and part of the spring blade is one contact point. The other point is stationary. Now if the switch (which is the timer in a gas engine ignition circuit) is closed, current will flow from the battery through the vibrator points, through the primary winding and back to the battery. The iron core now becomes a magnet. This attracts the piece of soft iron and it is pulled down.

This action separates the vibrator points and breaks

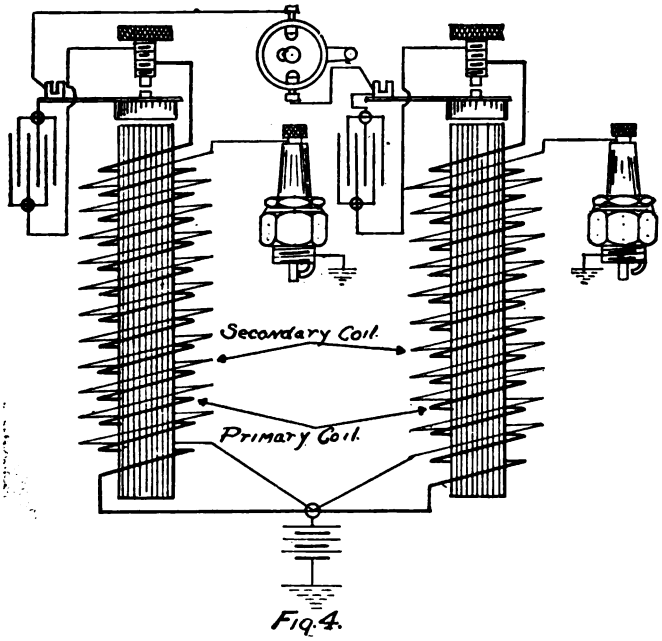


Fig. 4.

the battery current. This causes the collapse of the magnetic field, which causes the magnetic lines to cut the secondary winding and produce in it a new electric pressure, which because of the great number of turns in the secondary is strong enough to jump the air gap shown. As soon, however, as the battery current ceases flowing through the primary the iron core refuses to attract the piece of soft iron, since it loses its magnetism. The spring now again closes the points and now the same operation is repeated.

During the collapse of the magnetic field a flow of current is also produced in the primary winding. This induced voltage would have a tendency to reduce the effect of the secondary voltage by causing the core to try to retain its magnetism and therefore produce too slow a demagnetizing of the core. This current would also cause sparking at the vibrator points. This is prevented by the condenser.

The Condenser.

The condenser not only prevents this sparking at points but also intensifies the spark at the air gap. It is con-

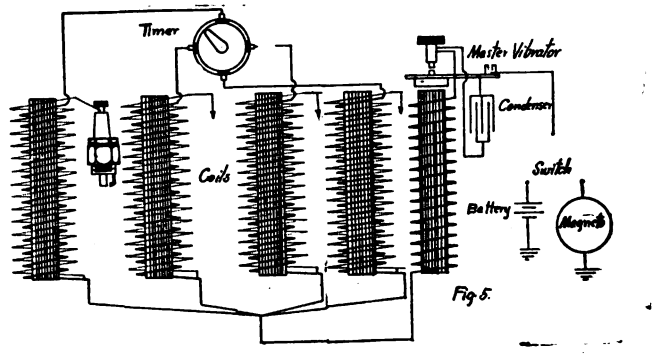


Fig. 5.

nected as shown. It consists of leaves of tinfoil separated by waxed paper. The alternate layers of tinfoil are connected together for one terminal. The other ends are connected for the other terminal.

In wiring an ignition system on a gas engine the metal of the engine often is used as a wire. This grounding is made use of in both the primary and secondary windings, and because of this one binding part can be eliminated. Fig. 4 is a complete internal and external wiring diagram of two coils for a two cylinder jump spark system. In

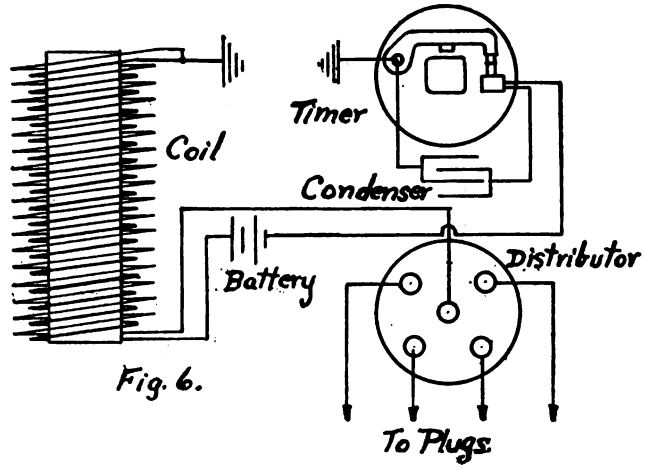


Fig. 6.

these multicylinder vibrating systems it is common to have a coil for each cylinder, but often one vibrator takes the place of all the others. This is accomplished by means of a master vibrator.

A master vibrator is no induction coil. It is a coil of only one winding. Its object is to operate the vibrator for every cylinder, but it does not produce the spark. Fig. 5 shows a complete four-cylinder system with a master vibrator. Notice that it has but one winding and that it is so connected that it is in the circuit of each coil, depending on where the timer has the circuit closed.

Another type of induction coil is the non-vibrating

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coil. Remember that in the vibrating coil the spark was actually produced by the collapse of the magnetic field due to the opening of the primary circuit which is accomplished by the separation of the vibrator points. In the case of a non-vibrating coil this has to, therefore, be taken care of otherwise. This is done by a mechanical device.

Two small metal points are mechanically closed and opened. These points are called the breaker points, or timer points or interrupter points. But since the breaking takes place but once, in this case just a single spark is obtained, instead of a stream of sparks as was the case with the vibrating coil. Fig. 6 shows a modern non-vibrating ignition system. In this system it is necessary to make one other change. In the vibrating system there was one coil for each cylinder. Now only one coil is used, therefore the secondary current must be led to the proper cylinder at the proper time. This is accomplished by a rotating switch called the distributor. This distributor must of course operate at a definite speed with respect to the breaker points, and they in turn must operate at a definite speed with respect to the engine.

Between You and the Rough Highway

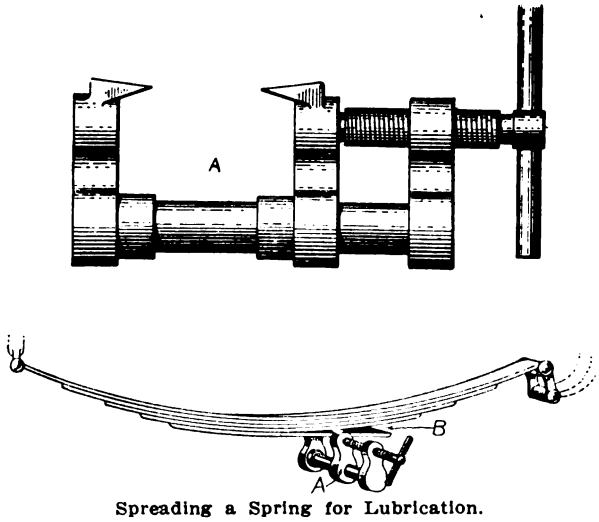
Perhaps You Never Have Realized How Important the Springs Are; Read This Article and Find Out.

BY WM. H. STEWART, JR.*

THOUGH you have never realized it, the one thing you desire in a car, above all others, is comfort. Your car may have the most power, consume the least gas and oil, have a shine like a new carriage, yet if it is not comfortable to ride in then it gives you no more pleasure than a wheelbarrow, unless you happen to be one of those amateur mechanics whose greatest joy is to "tinker" on the engine.

I have ridden in cars that looked like "ten thousand dollars" and returned from my trip a mass of bruises, so to speak. My back ached, my head was sore, and my nerves a total wreck. On the other hand, I have journeyed in machines that looked like "thirty cents" and returned refreshed and rested after a few hours of smooth and easy riding.

There is a great difference in cars, and this difference



Spreading a Spring for Lubrication.

is not always expressed in terms of dollars and cents. A penny is larger and heavier than a dime, but it is the material in it that counts.

Whether you own a Ford or a Pierce-Arrow, you can ruin it by inattention, or keep it in condition by a little care; you can make it ride like a steam-roller or with a smoothness similar to that of an airplane.

What the muscles in your body are to you, so are the springs to a car. Did you ever try this experiment? Next time you are in a trolley car, place your head against the frame of the window and notice how you feel every jar and knock of the wheels against the rails. These jars and shocks are absorbed by your body and your head is thus protected. Your muscles are a complex system of shock absorbers, just like the springs of an automobile.

But every muscle and part of your body is lubricated and kept in condition by the blood stream, while no such provision is made in the automobile. This machine requires attention or it will not give satisfaction, so you must learn how and why to give it proper attention.

When the springs on your car were made, the leaves were shaped, tempered, and as a final step they were polished before assembling. Each leaf was made just as smooth as possible and then given a heavy coating of grease, then assembled with the finished spring.

Before we can see the reason for lubrication we must consider how and why springs are made as they are.

Two qualities are essential in a spring. First, resilience, and second, strength. Either of these qualities can be obtained alone in any piece of metal, but to obtain the combination considerable ingenuity is necessary.

It would be an easy matter to make a spring from one solid piece of steel, but the spring would not be resilient. It would be easy to make a thin resilient spring, but it would not have strength. The answer is an easy one—make a spring from many pieces of resilient steel.

Each spring is made of several flat spring units called leaves. Each leaf is free to bend itself, without dependency upon the other parts; but each leaf forms a part

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and gives its strength until the combined spring has both springiness or resiliency and strength.

Let us suppose that a spring were made of two leaves, though usually five or six leaves are necessary for strength. The bottom leaf, which is termed the "main leaf," is fastened to either the body or the axle. Upon it rests the second leaf, and through the center of the two is passed a bolt, which is fastened to either the axle or the body, if the spring is of the semi-eliptic type.

As weight is placed upon the body the center of the spring is pressed downward, and as it was originally bow-shaped it straightens out. Now bear in mind that the ends of the lowest leaf are fastened firmly to the axle, and so the lowest leaf cannot straighten out as can the upper leaves.

As the weight increases the ends of the upper leaf slide along the next leaf below it, until the pressure is entirely transferred to the lower. No matter how many leaves there are, each leaf slides along the next below, until all assume the same shape, and the whole weight rests upon the lowest leaf.

One can see very easily that it is this sliding action that absorbs the jars and rebound of the car's weight and the road irregularities. This being the case, it is essential that each leaf be so arranged that the leaf above it can slide along its surface. If it is rusty or uneven there is danger that the leaf above it will be broken.

The first thing that one should do upon purchasing a used car is to examine the springs, remove them and give them a good cleaning and polishing. Coat them well with heavy grease or graphite and replace them.

With the springs on the car, if they are in good condition with smooth surfaces, they can be greased very easily. Jack the body up so as to remove all the weight from the springs and then loosen all spring clips.

The ordinary method of inserting a cold chisel by means of a heavy hammer or mallet may be effectual, but should not be tried on one's own car; it often results in bent or broken springs. Try to use one of the special wedges or clamps which are sold for a few cents at the accessory supply station and with it wedge apart the spring leaves.

Don't make the big mistake of wedging the leaves far enough apart to bend them; half an inch apart usually means a spoiled spring. Wedge the leaves just far enough apart so that you can get a thin case knife between them; then apply just as much grease as you can. Take a fine piece of string and thread it between the leaves, and with the string spread the grease all over the spring surfaces. After this has been done, smear on about half a teaspoonful of Dixon's flake graphite and spread it with the string over the grease; then start on another leaf.

When all the leaves have been treated in this way wipe off the surplus grease and the job is done. After you have once treated the springs in this way you need not bother again for a whole season if you are careful to oil them every five or six hundred miles.

Now all of your work will be for nothing if you do not make sure of another little point: oil the spring suspension bolts. One seldom realizes that all of the weight of the whole car rests upon these bolts; inspect them regularly; as soon as they show wear, replace them. Keep them oiled.

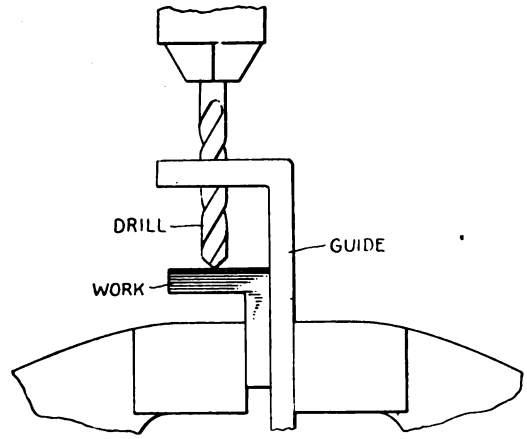
*President Stewart Automobile School.

A GUIDE FOR A SMALL DRILL.

By CHAS. E. DURYEA.

DRILLING a small hole by hand power is not easy, not because of the pressure required, but because of the care needed to avoid breaking the drill. Care requires time, and drills are hard to get. Both should be conserved. The drill guide is a simple device that obviates the need for care and so permits greater speed and pressure, and this is true whether hand drill, bow drill, breast drill or bit brace is used.

Its principle is a modification of the well-known fact

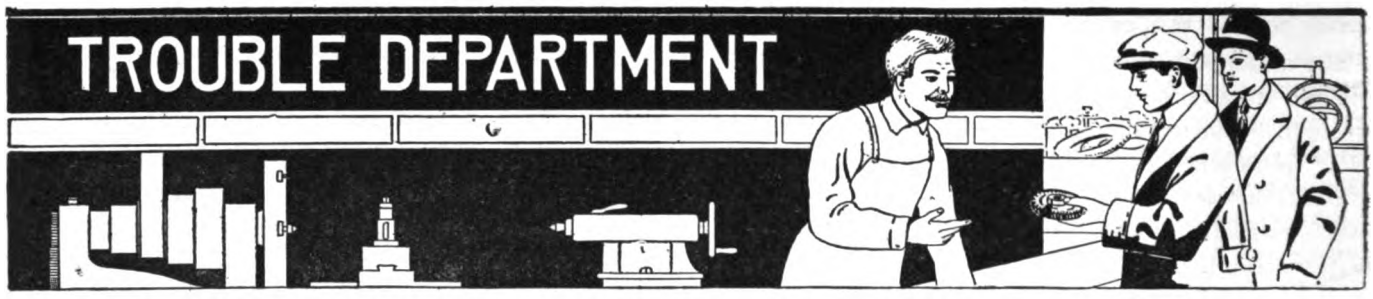


Guiding a Small Drill.

that a sewing needle can be driven through a copper cent if it is first driven into a cork. The cork prevents the needle from bending under the blow and breaking. Small nails, which would otherwise bend and require boring a hole for them first, can be driven safely in the same manner.

The guide is formed of a piece of steel having in one end a hole, and so shaped that this hole may be held above the work. Usually the guide and the work are gripped in the vise together and the guide can be slipped down as the hole gets deeper. Or the guide can be bent so as to permit clamping to the work. It need not be very stiff and so can be bent easily to fit other jobs. The hole need not fit the drill closely, but must prevent the drill from swinging off to one side far enough to be damaged—for no matter how steady one's nerves, it is not easy to avoid "wabbling" the drill. The effect of the guide is much that of having a very short drill.

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2530 Squeaks in Wheel Bolts.

From C. W. Walden, Tennessee—Will you kindly answer through the "Trouble Department" how I can stop the squeak of the lug bolts and wheel rims? I have tried every remedy I know.

Reply: Remove the bolts and the clamps from the wheel and give both the bolts and the notches a coating of graphite mixed with oil. You can mix this yourself by placing a few teaspoonfuls of flake graphite in a dish and moistening it with just enough cylinder oil to form a thick paste. It is very possible that the squeak comes from loose spokes. In any event, should you find this to be the case, or should you find that the graphite does not work satisfactorily, mix up a solution as follows:

Place a half pint of gasoline in a tin and place the tin into boiling water. The water should be brought to a boil and taken from the open fire else there will be danger of an explosion. The boiling water will warm the gasoline and to the gasoline add as much paraffin as the gasoline will dissolve. Upon cooling this solution will harden, and to prevent this add about four teaspoonfuls of gasoline while the mixture is still hot. You can easily pour the mixture down the spokes in the wheel or dip all of the bolts and fittings into it. The gasoline will evaporate and leave a thin surface of paraffin.

2531 The Ford Magneto.

From I. D. Bush, North Dakota—I have an old 1910 Ford car which I have just fitted with a new cylinder block. While I had the machine apart I put in a set of new magnets and coils. I thought that with the new magnets I could get more current and so run the ignition and lights.

I used the greatest of care in putting the magneto together but it will not give sufficient current unless the engine is run at high speed, and I cannot start it without batteries.

When the lights are switched on, the engine stops immediately, if it is being run upon the magneto. The dealer from whom I purchased the magnets, kept them in a pile, corded together, seemingly with no arrangement. I don't even know how long he had them in his store. Would that make any difference If the magnets were drained of their strength would it account for my trouble?

Reply:—The magneto on a 1910 Ford was not designed for heavy work, but if you replace the magneto properly, for a time at least, you should be able to obtain sufficient current to operate both the ignition system and the lights.

If the agent piled the magnets indiscriminately you should not have purchased them without giving them a test. Each magnet should separate a weight equivalent to that of the cam shaft timing gear.

When installing the magnets, the north poles of the two adjacent magnets should be together. The distance between the steel magnet poles and the spools should be approximately the thickness of a visiting card. You can arrange the steel magnets in the proper order if you remember that like poles repel each other and unlike poles attract. It does not matter which is north and south so long as you get two north poles together and two south poles together.

2532 Questions On Dodge Brothers Car.

From Walter Jordan, Nebraska.—Will you please answer the following questions, all of which relate to a 1917 Dodge Brothers car.

Will too lean a mixture cause the engine to overheat?

What is the cause and remedy of whistling carbon brushes in the generator?

What is the cause and remedy of a green substance that forms on the positive battery terminal?

Will any damage result from this green deposit?

What is the cause and remedy of grease working out at the brake bands?

How are valves removed?

How can I tell if there is a leakage around the valve stems?

If the water in the storage battery evaporates slowly is it a sign of a fully charged battery?

If the specific gravity of one cell is lower than that of another, would it be policy to remove some of the stronger solution and put it in the weaker?

Reply:—A lean mixture will not cause the engine to heat. The two main causes for heating are wrongly timed valves and retarded spark. The exhaust valve should not close until after the piston has passed top center. The spark should be set so that when the engine is started it occurs at about ¼ of an inch on the flywheel after top center and can be advanced the whole range of the quadrant. It should be advanced as far as possible without causing the engine to labor or knock.

The whistling carbon brushes on the generator are caused by lack of lubrication or improper fitting. The surface of the brush should conform to the curve of the commutator. The commutator should be kept lubricated

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by dipping the finger in vaseline, wiping off the surface and touching the finger against the commutator. There should be just enough vaseline on the commutator to leave a thin surface, but not enough to be noticeable.

If the mica extends above the surface of the commutator, the brushes will not work smoothly. The mica should be kept down below the surface slightly.

The corrosion forming on the battery terminals is due to acid action on the lead. You can prevent this by cleaning off the oxide and coating the terminal over with vaseline. The only damage that this corrosion will do is to make for poor connections.

The only way to prevent the grease from getting on the brake bands is to substitute a heavy felt washer on each side of the differential housing bearing. Evidently your felt washer is not heavy enough. Put in another if there is room or substitute with a new one if there is not room for two others.

To remove the valves all you will need to do is to lift the valve spring and valve spring retaining washer with a valve lifter. Then pull out the spring retaining key. The valve can then be lifted out. Worn valve stems or valve stem guides can be detected by starting the engine, and while it is operating, squirt some gasoline around the valve stems; if the engine action alters it evidences that the gasoline is drawn past the stems.

If the water in the storage battery evaporates fast it indicates overcharge or leakage. If the water is slow to evaporate it means that the battery is kept in fairly good condition. The specific gravity of all cells should be approximately the same. The solution should not be removed from one cell and placed in another. Only a battery man can bring the electrolyte to the proper specific gravity.

Oil Pump Out of Order.

2533

From W. B. Campbell, Illinois.—I have a 1916 Baby Grand Chevrolet on which the oil pump fails to function properly. It has been balky at intervals all summer and will not pump the oil into the dash sight. Formerly it worked almost too well, it pumped too much oil and did not run out of the sight as fast as it ran in.

Last week the pump failed entirely. I took off the cover from it and noticed that though the cogs or gears turned all right, there seemed to be considerable play in them. I should think that by racing the engine I would be able to get some flow of oil.

Reply:—Your trouble is probably due to the end play in the oil pump gears as you suggest, but before replacing these gears we should advise you to try the machine after you have primed the pump. Are you sure that the pipe leading from the pump to the base of the engine or the passageway leading through the strainer is clean?

Be sure that everything is clean before you replace the gears. A gear pump of this type, once it gets dry, is apt to stop functioning. You can prime it by filling it with oil and it should then start. Of course if the gear pump does not work at low engine speeds, it will make no difference whether the engine is raced or not. The gear pump is positive, that is, it should pump oil at any engine speed.

Scraping Sound in Ford.

2534

From S. Lloyd, New York.—I have a 1917 Ford car which has developed a scraping sound when running down hill or idling. This noise seems to be growing louder as time goes on.

The engine also lacks power when running at low speeds and will not pick up on a grade. Recently it has troubled me by overheating. The local repairmen cannot seem to locate the troubles.

Reply:—The scraping noise of which you complain probably arises from trouble in the clutch, the magneto, or the gear-set. The only way to find out just where the trouble is, will be to disassemble the gear-set and find what member is pressing against either the cones or the flywheel. There are so many possibilities that we could hardly cover them in two pages of the magazine. The reasons for lack of power are as follows, any or all of which may be your troubles. Check off the points we mention, and if you do not find the trouble let us hear from you later:

> Carbon in cylinders; leaking valves; loss of compression; leaks around valve stems; poor ignition system; the spark is not advanced far enough; valves improperly timed; too rich a mixture; faulty ignition coils.

The spark should be timed so that it will occur with the spark fully retarded just after the piston has started on the down stroke. The exhaust valve should close at dead top center. Your ignition coils should give a spark at least ¼ of an inch in length. The clearance between the valve stems and the tappets should be approximately 1/64 of an inch and not more than 1/32. All of the manifold line should be tight. Adjust the carburetor for the leanest possible mixture.

Grinding Valves.

2535

From D. C. Gairing, Pennsylvania.—Will you kindly tell me how to grind valves, what to use for grinding, how the valves should look and about how long a time is required for the work.

I followed the timing as instructed in the Ford instruction book and found that the distance between the push rod and valve stem varies in the several valves. What would cause that? I cannot seem to adjust them properly.

Reply:—For grinding valves you can obtain a specially prepared valve grinding paste at any automobile supply house. This paste comes in two or three grades, fine, medium and coarse. If the valves are badly pitted you should use the coarse grade and grind all of the valves until it is evident that all parts of the face are being ground. Then use a fine grade and continue to grind the valves until the surface is smooth and has somewhat

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the appearance of a piece of fine ground glass. (You can see what ground glass looks like by inspecting the finder on any camera.)

The valves are considered well ground when they can be dropped into place and oil poured in on top without leaking past them. Be careful not to get the grinding paste into the cylinders or into the valve stem guides.

In grinding valves do not turn them completely around. Turn them back and forth about one-quarter of a revolution. After four or five movements, turn them forward one-half a revolution, then back and forth one-quarter of a revolution again, then forward one-half a revolution and so on until every part of the valve has been ground against every part of its seat. To get good results you should spend at least half an hour on each valve. A repair man can do it in less time, but he is experienced.

After the valves have been ground they should all be dropped into place and the valve clearance between the valve stem and the tappet adjusted. In order to get this clearance correct for each valve, turn the engine over until the tappet has risen and dropped back into place again. Then turn the fly-wheel one-half a revolution more. Then adjust the valve clearance so that it is not more than 1/32 of an inch and not less than 1/64. All valve clearances should be the same.

After the valve clearance has been adjusted time them so that the exhaust valve in number one cylinder will open when the piston reaches a point 5/16 of an inch before bottom center. To verify this setting turn engine over and see that the exhaust valve closes at top center or shortly after top center.

If the valves are not adjusted properly the engine will overheat. Your trouble with the valve stem adjustment and timing arose probably from the fact that the engine was incorrectly timed or the valve clearance in all of the cylinders was not properly adjusted to start with.

2536 Retiming An Old Oakland Car.

From E. H. Buckingham, Nevada.—As I am 50 miles from the nearest repair shop I would like some advice from you relative to my old, four cylinder, Oakland car, Model 42, year 1913.

This machine is equipped with an Eisemann high tension magneto which has an automatic spark advance. A short time ago the front connecting rod broke loose and about wrecked the machine. I replaced the broken parts and as I had taken off the gears and replaced them with new, I cannot tell how to set the timing of either the valves or the magneto.

Will you kindly tell me how to time the valves and the magneto and how to find the proper firing order?

Reply:—The first thing that you must do is to time the valves properly and as we have no records in this office showing just the proper position for this old model car, we will be obliged to give you general direction and let you find by experiment just the proper setting.

First, turn the crankshaft until the piston in number one cylinder is at the top of its stroke. As you turn the crank shaft notice the direction in which the cam shaft turns. With the piston at the dead top center, turn the cam shaft in its direction of rotation until the exhaust valve in number one cylinder has opened and closed. You can determine this by placing a piece of paper between the valve stem and the tappet, and as soon as you can release this piece of paper mesh the gears. This setting is merely made as a trial.

Turn the crank shaft over one full stroke and the piston will be at the top of its compression stroke. Note the position of the crank and turn it forward 135 degrees. If the exhaust valve starts to open before you have turned the engine 135 degrees, remove the cam shaft gear and reset the cam shaft so that the exhaust valve will start to open at 135 degrees past the top of the compression stroke.

This 135 degrees is equivalent to 45 degrees before bottom dead center. On the average engine the exhaust valve opens between 40 and 45 degrees before bottom center and 10 degrees past top center.

Your engine, however, being of the older type, may require a different valve setting and it is very possible that the exhaust valve opens later than at 135 degrees past the top of the compression stroke. At any rate it should not close before dead center under any considerations.

After you have set the valves, turn the engine over again until the piston in number one cylinder is at the top of the compression stroke.

In any four cycle gasoline engine there are two upward strokes of the piston, the exhaust and the compression strokes. In the exhaust stroke, the exhaust valve will be open to allow the dead gas to escape. In the compression stroke both valves will be closed. There are two downward strokes, intake and power strokes. Upon the intake stroke the intake valve is opened. Upon the power stroke both valves are closed and as we said before, the exhaust valve opens between forty-five degrees and bottom center of the power stroke. The strokes occur in the following order:

Down, intake; up, compression; down, power; up, exhaust, etc.

With the spark fully retarded, set the piston in number one cylinder at the top of its compression stroke, then turn the flywheel one-half inch further around in its direction of rotation. The piston will then be starting on its downward power stroke. Then turn the magneto armature in its direction of rotation until the points in the breaker box start to separate. They will be together but as soon as the engine turns the slightest the points should begin to separate. At this point the gears should mesh.

Then remove the distributor cover and notice under which distributor connection the brush is located. Connect this terminal with number one cylinder. Then turn the engine over and watch the distributor brush to see what direction it runs. Beginning with number one connection, connect the balance of the secondary wires with the distributor points in their firing order.

To find the firing order open the compression cups or remove the spark plugs. Turn the engine over until air

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is forced by the compression stroke through the spark plug hole or the compression cup in number one cylinder. Then put your hand over number two and three cylinders and see from which cylinder the air is being forced. If it is from number two cylinder then the firing order is 1-2-4-3. If the air is forced from number three cylinder it is 1-3-4-2.

To make sure of this turn the engine over until the exhaust valve in number one cylinder starts to open. Then watch the exhaust valves in cylinders number two and three. The exhaust valve in number two cylinder will open next in order if the firing order is 1-2-4-3. If, however, the firing order is 1-3-4-2, the exhaust valves will open in that same order.

A Clogged Radiator.

2537

From J. A. Frentress, Iowa.—I have an Overland car, model 90, and am bothered by the engine overheating. I live about three miles from town and cannot make the trip at the rate of 25 miles per hour without overheating the engine. Repairmen have spent some time on it but as yet have not remedied the trouble; can you make any suggestions?

Reply.—Your trouble is probably due to the fact that there are deposits in the cooling system. Mix up a strong solution of potash lye and water, and after removing the water from the system pour in this potash lye, being careful to strain it through a cloth. One can of potash lye should be used with enough water to fill the radiator.

Run the engine until the solution has been thoroughly warmed, then let it stand for a half hour, then drain the potash lye from the cooling system and turn the hose into the top of the radiator while the engine is running.

If the engine overheats after this treatment, do the same thing with a strong washing soda solution. If you still experience trouble clean all of the engine motor passages with a flexible iron wire, then apply the potash or soda solution again.

Removing Storage Battery.

2538

From J. Ashei, Oregon.—I have a 1916 Oakland Six, model 32-B car that is equipped with a Deaco lighting and starting system. I would like to know if there is any way to operate the car without the storage battery, using the generator for lights and ignition. Is there danger of damaging the generator?

Reply.—Whether or not you can use your car without the storage battery without damaging the generator is a matter of experiment, and we would not advise you to continue it for any length of time.

For the first hour or so of running you will need to watch the generator rather closely, so that you will not burn it out. After having removed the battery connect the wire which leads from the starting switch originally to the positive battery terminal with a headlight bulb of the size which you are using in the headlights, and connect the other terminal of the light with the frame.

This light should give you enough resistance so that there will be no danger of burning out the generator, but you should examine the generator every two or three minutes for the first half hour, and be sure that it is not overheating. If it overheats, stop the engine and install another storage battery which you will be able to hire from any service battery station. If you are on the road at the time, disconnect the wires leading to the brushes in the generator to prevent that unit from burning out.

If you are able to use the light in place of the storage battery without overheating the generator, you must realize that the headlights and the lighting system will only become operative after the generator has reached a speed corresponding to from 12 to 15 miles car speed.

Long Stroke Engines.

2539

From F. J. Huper, Nebraska.—Will you tell me if a long stroke engine has more power than a short stroke engine? For instance: which has the most power, an engine having a bore of 4¾ inches and a stroke of 6 inches or one with a 4¾ inch bore and a 3 inch stroke?

If the stroke has anything to do with the power, why does not the S. A. E. or A. L. A. M. formula take the stroke into consideration?

Reply.—The horsepower of an engine is dependent directly upon three things: the size of the combustion chamber, the piston travel and the number of cylinders.

The A. L. A. M. formula for figuring the horsepower says, multiply the bore by itself, then by the number of cylinders and divide by 2½. This formula is correct only when the piston is traveling at the rate of 1,000 feet per minute. If, for instance, you had an engine having a 6 inch stroke and the flywheel were traveling 1,000 revolutions per minute, the piston would travel 1,000 feet per minute, and the formula would be correct. If the stroke were shorter than this and the engine ran at the same speed, it would not develop as much horsepower. For instance, compare two engines both having 4¾ inch bore. The first has a 6 inch stroke. The second has a 3 inch stroke, both run at 1,000 turns a minute.

Although the S. A. E. formula would show them as developing the same horsepower, the one having the 6 inch stroke would develop, theoretically, twice as much horsepower. If, however, the short stroke engine were operated at 2,000 turns a minute, it would develop the same amount of power. As a matter of practice the shorter the stroke the higher speed can the engine be run. Therefore the S. A. E. formula applies to the average engine.

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2540 Filling Dry Batteries.

From P. E. Steves, Wisconsin.—Will you kindly tell me how I can refill the type of dry cells that are used for ignition and telephone work?

Reply.—A dry battery cannot be refilled unless the zinc casing is in good condition, and the results are always questionable. In some cases you can refill a battery and it will last longer than it would originally; in other cases nothing you can do will put the battery in operation again. Still, the experiment is always worth the trouble; at least in the writer's estimation, especially now that dry batteries cost so much.

In the first place, punch a row of holes about half an inch apart around the battery slightly above the center. Do not get these holes too close together. They should be punched with a heavy nail, and be slightly more than ⅛ inch in diameter. About one inch below this row of holes, punch a similar set, but stagger them. If there is room, punch a third row. Do not punch any in the bottom or the top, however.

Secure a jar large enough to contain the battery, and fill this jar about half full of a strong mixture of sal-ammoniac. Then put the battery in the jar and let it soak over night. The liquid should not come more than half an inch above the top row of holes, or there will be danger of destroying the battery. After the battery has stood over night in the solution remove it, and after wiping it dry slip it back into its pasteboard case.

Note.—The sal-ammoniac of which we spoke is a white powder which is commonly used for recharging ordinary wet batteries. Any druggist will know what it is.

2541 Electrical Questions.

From H. M. Wineberg, Pennsylvania.—Will you tell me how many kilowatts would be used on a direct current line in 30 hours of time? That is supposing the line voltage is 250 and 2 amperes are flowing steadily all the time.

Is the frame of a Ford car positive once out of every cycle of the alternating current?

How does the high tension circuit on a Ford car return to the coil? The coil has only three terminals.

Reply.—You would use 15 kilowatt hours of current on a 250 volt line in thirty hours if two amperes flow continually. You arrive at this by multiplying the volts by the amperes. This gives you the watts and if you multiply the watts by the number of hours it will give you the number of watt hours, which is 15,000. One thousand watts are equal to one kilowatt and as you have 15,000 watts, you will have 15 kilowatts in thirty hours.

The frame of a Ford car is positive once out of every cycle of the alternating current fluctuation. For every revolution of the flywheel there are sixteen changes in the direction of the current. Therefore if the engine is running at a rate of 1,000 turns a minute the frame will be positive 16,000 times every minute, and negative as many times per minute.

The word "cycle" primarily means the completion of a series of events.

The high tension circuit on a Ford car grounds through the timer and one side of the primary coil and through the magneto or batteries on the other side of the primary coil. The only time that the high tension coil is in action is while the timer roller is in contact with one terminal of the primary winding. Through this terminal the primary winding is practically grounded and offers no resistance to the high tension current. The high tension coil is connected to the primary winding of the coil inside the coil box.

2542 Batteries and High Tension Magneto.

From E. F. C., New York.—If a car is equipped with a high tension magneto and it does not supply sufficient current to start the engine, can dry or storage batteries be attached in such a way as to build up the magneto current?

I have a Maxwell touring car, 1914 model, and the engine tends to overheat, even when idling. I have ground the valves, installed a new fan, advanced the timing. Will an engine overheat because of advanced timing? What do you think is the trouble? I might add that the engine pulls excellently and does not knock.

Reply.—We cannot recommend the use of dry batteries with a true high tension magneto. The only type of magneto that we care to recommend for use with batteries is of the dual type and this machine utilizes a secondary coil for the batteries. Where batteries are used with a high tension type there is danger that the permanent magnets will be demagnetized.

Overheating in your engine cannot be due to a spark advanced too far. An engine will not overheat for this reason alone. A retarded spark is one of the things that causes it to overheat. Your trouble is probably due to deposits in the water jacket, in the engine itself or possibly because the gaskets which you use have not been punched through at the proper places and do not allow full circulation. Are you sure that the pump is functioning properly?

We should advise you immediately to mix a strong solution of potash lye and water, fill the radiating system with it and run the engine for about five minutes. Let it stand for a few minutes, then run the engine again until the mixture is heated. Draw off the mixture and flush the whole system well with clean water. Replace all of the hose connections with new ones. If the engine still overheats put back the old hose connections and mix up a strong solution of washing soda and water. Use this in the same manner as the potash solution. In both cases be sure to strain the solutions through cheesecloth, to remove the dirt, lumps, etc.

If after having cleaned the cooling system in this manner, the engine still overheats, let us know.

Of course you understand that the first thing you must

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do is remove the head and be sure that the gaskets are punched in the proper places and then scrape out all of the sediment in the water jackets with a long flexible wire.

Engine Will Not Idle.

2543

From Andrew Jenkins, Ohio.—I have a Buick truck, model D4, which has been giving me trouble for about three months. I have had the carbon removed, the valves ground, ignition system tested and carburetor replaced with a new one (Rayfield), yet the engine will not throttle to an idling speed without backfiring and stopping.

It pulls satisfactorily and runs fine at speeds above 15 miles per hour, but below that it jerks and runs unevenly.

Reply.—Very evidently all of your trouble is due to the fact that there is a leakage around the valve stems which permits the engine to take too much air at low speeds. As the car speeds up, however, this excess air is just enough to keep it running smoothly.

With your engine running at normal speed, take a squirt can filled with gasoline and squirt a slight amount of gasoline around all of the valve stems or in openings into the combustion or intake line. If the engine action changes with the application of gasoline it evidences a leakage at that point.

Let us know the results if you cannot locate the trouble.

Overcharging a Battery.

2544

From R. Kanogawa, Washington.—Will you kindly tell me if there is any device which prevents the overcharging of the battery in the present car? How many kinds of current regulators are in general use? Will you please explain about the third brush regulation? How is the size and capacity of a magneto determined?

Reply.—We know of no device which automatically prevents the overcharge of a battery, in use at the present time. The only thing that really answers the purpose is what is termed a "touring switch" by which the operator can cut off the battery from the charging unit when going on a long tour.

Many machines, however, are so arranged that the charging rate is extremely low and a battery is not overcharged to any great extent if the lights are used during the evening once or twice a week.

At the present time the following systems of regulations are used: third brush; reverse series, magnetic resistance relay, thermo regulator. In brief the third brush method of regulation is as follows:

The third brush ordinarily is spaced about one-third the way between the two regular brushes. Assuming that it is nearest to the negative brush the current for exciting the fields is taken from the positive brush through the fields to the third brush. With the dynamo running at normal speed the fields build up to their maximum.

As the armature speed increases, there is a distortion of the fields in the direction of armature rotation. Under ordinary conditions the voltage drop between the regular brushes we will assume to be six volts. Then the voltage difference between the positive and the third brush will be, we will assume, 5½ volts. As the lines of force in the field system are distorted the voltage in the fields drops and the output of current is not as great, dependent entirely upon the position of the third brush.

If the third brush is moved in the direction of rotation of the armature nearest to the negative brush or the brush from which it is one-third distance away, then the voltage output of the generator will be increased.

If the third brush is moved back against the direction of rotation and nearer midway between the two brushes, the voltage output will be decreased.

We do not quite understand what you mean by the size and capacity of a magneto. The capacity of a generator is determined by the number of volts and amperes which it furnishes at its normal running speed.

For instance, if a generator furnished six volts and twenty amperes, it would furnish 6 by 20 or 120 watts. Seven hundred and forty-six watts equals one horsepower, therefore 120 watts would be approximately one-sixth of a horsepower.

Ford Car Compression.

2545

From S. E. Miller, Mississippi.—I have a 1913 Ford car in the engine of which I have recently installed a set of new rings, scraped all bearings, ground the valves and given it a good overhauling.

There is a light knock in the engine at all times that I cannot locate. Some days it is very evident, other days almost gone. After the engine is heated there is hardly any compression and I can spin it easily. The pressure or compression is 40 pounds, what should it be?

Can you tell me what brass and aluminum are worth per pound? Would you advise me to purchase a 1910 ——— car? This machine will cost me but $30. Do you think I can make anything out of it?

Reply.—The compression in this engine should be between 50 and 60 pounds. Evidently the cylinders are scored or the rings do not fit properly. We should advise you to make sure that the cylinders are in good condition. If not have them reground or rebored and then fit the machine with a set of leak-proof rings. Before you do this, however, examine the valve clearance.

If the engine is heated, the distance between the valve stems and the valve tappets should be approximately 1/64 of an inch. Possibly your trouble is due to the fact that this clearance is not great enough. As soon as the engine heats one of the valves is held open at all times.

The tapping noise which you hear may be due also to improperly adjusted valve clearance.

We cannot advise you as to the probable value per pound for brass or aluminum for the very reason that this

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figure varies greatly in different localities. The only way for you to get a reliable figure would be to ask a junk man. The figure which he will give you of course will cover the pure metal. That is, you will be unable to sell a piece of cast iron with a bronze bushing in it at either the figure for junk iron or junk brass. You will be obliged to drive out the bushing before you sell.

The junk value of a 1910 ——— car should not be as high as $30 unless the tires can be used again. Whether is is worth $30 or not to you depends entirely upon what you can use it for. We doubt very much if you can use a 1910 ——— for any practical purpose, as a car. You might be able to repair the engine for use in a launch or you might be able to use some of the parts on another machine, but we doubt if you can ever repair the car at a reasonable figure so that you can ride in it comfortably.

You might be obliged to pay nearly $100 to get it into condition again, and after you have made all of these repairs you would not have a satisfactory machine.

We would advise you to put $100 with the $30 and buy a second-hand Ford car of a later date. We feel that you will be making a mistake in paying even $30 for a 1910 car of this type.

Soldering Ford Radiators.

2546

From "A Friend in Need."—I would like to ask for information regarding repairing of radiators of the Ford type. Is there any way to take out an old tube and put a new one in its place? This seems impossible to me for the reason that all of the cross fins are soldered to each tube.

Now if one cannot remove the tube, how can it be repaired? There are a number of them in a row, one behind the other. It is easy enough to get at the first row, but how about the third or fourth tube?

Is there any kind of acid besides muriatic that can be used to clean the tubes?

Reply.—There are two ways in which radiators of the Ford type are repaired. In the first place if the leak is small and near the front, four or five of the cross fins are removed with a small hacksaw or cold chisel, taking special care not to damage the rest of the tubes. This leaves room to reach the tube and solder it from the outside. An expert radiator repair man frequently can spread the fins apart and by using a long thin-pointed soldering iron, repair the front row of the tubes.

The second method entails the removal of the upper back part of the upper tank and the lower part of the lower tank, thus exposing the ends of all the tubes. The broken tube is then plugged up both at the top and at the bottom, or if a smaller tube is obtainable which can be slipped into the damaged tube, it is cut off one-quarter of an inch longer, slipped into place, expanded at both ends and soldered.

No matter what process you use for soldering, the job is a big one. In many cases the tinsmith will not bother to undertake it at all.

We do not know of any battery soldering fluid other than muriatic acid cut with zinc. The acid will clean any surface if properly used. For ordinary purposes you might keep two grades of this acid mixed. One differs from the other in that it contains about 5% pure acid. To mix the acid proceed as follows:

Obtain the ordinary commercial acid and dilute it with about 30% with water. Put into it as much zinc as it will dissolve. Let it stand about two days, shaking it occasionally. Then strain it through cloth and divide it into two portions. The first portion can be labeled "soldering fluid—non-acid."

Into the second solution put about 5% commercial acid. Label this "cleaning acid." In this way you will have a slight acid action to the second portion and you can use this for removing grease or dirt. Of course in every case you must clean the part thoroughly after having used the acid or it will destroy the metal.

Magneto on Single Cylinder Engine.

2547

From W. O., Massachusetts.—I have a single cylinder kerosene engine fitted with a jump spark coil system which is now operated by four dry batteries. I have a Bosch four-cylinder magneto, model 5. Is there any way to use this magneto for ignition on the single cylinder engine? What speed must I drive the magneto? Can I use a belt for the purpose?

Reply.—You should have no trouble in operating a single cylinder engine on a four cylinder Bosch magneto. The magneto should run at crankshaft speed, that is, the gear on the crankshaft should be the same size as the gear on the armature of the magneto. Do not use a belt.

To time the magneto proceed as follows: Turn the engine over until the piston has reached the top of its stroke, then move the flywheel in its proper direction of rotation one-quarter of an inch. Note which direction the armature of the magneto turns. Remove the magneto gear and turn the armature until the breaker points begin to separate. By this we mean that the breaker points will be together, but if the armature is turned the slightest the breaker points will begin to separate.

At this point mesh the gears. Then remove the cover of the distributor and note under which distributor connection the brush is located. Connect this secondary connnetion with the spark plug. The next secondary wire on the distributor should be connected on the ground. The third distributor wire should be connected with the plug and the last connected with the ground. That is, connect each alternating terminal with the plug.

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Metz Car Overheats.

2548

From Chas. R. Thompson, Colorado.—I have a Metz 1914 car which I have recently overhauled. Why does the water have a tendency to boil excessively under moderate engine speeds? Would this boiling be caused by the precipitation of a non-leak solution applied in too excessive a quantity? If this is the case, how can I remove the solution?

Reply.—If you have used any non-leak solution in your radiator, it is possible that this solution was mixed improperly and did not contain enough water. Possibly it has filled some of the tubes, and if so, you can remove it in the following way:

Drain all of the water from the system and mix up a solution of potash lye and water, one can of potash added to enough water to fill the radiator.

Strain this mixture through a cheesecloth, to remove all of the lumps and dirt and pour it in the radiator. Be sure that the system is full of the mixture. Start the engine and let it run until it has thoroughly warmed. Let it stand for ten minutes, start the engine again, let it stand for ten minutes, start the engine a third time and while it is still running drain out the solution, and while it is still being drained turn the hose directly into the top of the radiator so as to flush out the whole system.

If you do not have a hose connection at the garage do not drain the solution while the engine is running but fill it with clean water, run the engine until this water is warm, drain it off and flush with clear water until all traces of the potash have been removed.

If you still have trouble from overheating, mix up a strong solution of washing soda and water, one-half pound to enough water to fill the radiator, and use this solution after straining, in the same way that you used the potash lye solution.

If it is possible we should advise you to remove the cylinder head and clean the water passages with a stiff wire as much as possible.

There is another possibility for your trouble, and that is that the spark may be retarded too far. The spark should occur at dead top center of the piston stroke.

If after following these instructions and checking off the spark you are unable to remedy the trouble let us hear from you, and we will advise you further.

Be sure to let us know if you have adjusted the valve clearance properly, removed the carbon and ground the valves.

A Bad Knock.

2549

From C. M. B., New Jersey.—My engine has recently developed a serious knock which I cannot seem to locate, possibly it is in the connecting rods or the camshaft though I have recently tightened the connecting rods. The knock is more evident when the engine is running and the car is still, and often with the throttle opened the knock disappears. I have had a number of garagemen investigate the trouble and they differed as to opinions, one said that it might be the camshaft. If this is the case, how can I fix it? Is there danger of snapping the crankshaft because of a loose connecting rod?

Reply.—From your description of the knock, we are inclined to believe that it is caused by excessive compression or excess carbon. We cannot quite see why the camshaft should cause a knock of this sort. The camshaft knock would be noticeable no matter at what position the spark occurred. We are more inclined to believe that the trouble's in the main bearings or in the connecting rods, but carbon accumulation is the first supposition.

We are afraid that we must ask you to give us more details and answer the following questions: Are the valve clearances properly adjusted? When did you have the valves ground and the carbon removed? At what speed and by what device can you remove the knock entirely, that is, does the knock disappear when the engine is running at extremely low speeds with the spark fully retarded? Does it make any difference whether the engine is heated or running cold? Are you troubled by carbon deposits in the cylinders? Does the engine lack power? And last but not least, what sort of a car is it, the year, make and model? The year is especially important.

There should be no danger of snapping the crankshaft because of a loose connecting rod. There is more danger that the connecting rod will break loose and punch a hole through the base of the engine or otherwise wreck the machine. The crankshaft will withstand more hammering from the side or top than any other part of the whole machine.

In locating a knock and before you write us again, try the following experiment:

Obtain a stick of wood such as the carpenters use for dowelling about a foot in length and as large around as a pencil. Place one end of this between your teeth and press the other against the various parts of the engine. You will find that you can locate fairly accurately the position of the knock, that is, whether it is near the top of the cylinder or at the bottom, whether it is near cylinder number one or cylinder number four, or at the center.

Cleaning an Emery Wheel.

2550

From Cesco Swinney, Missouri.—I have a small emery wheel which is filled with oil which escaped from the bearings and I cannot grind with it. I have tried to clean it with gasoline, but it only made matters worse; how can I clean it?

Is there a substitute for gasoline for cleaning the patch and rubber in vulcanizing or cementing? The gasoline at present is so full of oil that it is hard to make patches stick.

Reply.—The glaze on an emery wheel can be removed with what is termed an emery wheel dresser. This

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device is a small, rough wheel mounted in a piece of iron which is pressed against the emery wheel while the latter is in motion.

You should be able to borrow an emery wheel dresser from any of your local machine shops, or possibly the nearest garage. If you cannot, it is possible that you may be able to scrape the glaze off by means of a heavy cold chisel. The cold chisel is held against the wheel while the latter is revolving so that the sharp points scrape against the surface. Be very careful or you will split the wheel open if it revolves at very high speed. In using the emery wheel dresser there is no danger.

Instead of using the commercial gasoline for cementing patches on tires we would advise that you obtain a quart of benzine from the drug store. Benzine is practically gasoline, while the present-day gasoline is practically kerosene.

Peroxide of Hydrogen in a Cylinder.

2551

From H. D. Storms, Canada.—On a Franklin car I have installed a device which introduces water into the intake manifold for the purpose of removing and preventing the formation of carbon. Some of the carbon seems to be disappearing. Do you think that hydrogen peroxide could be used to advantage in place of water? Would it damage the engine? I should think that the extra atom of oxygen might assist materially in oxidizing the carbon.

Reply.—We would not recommend the introduction of hydrogen peroxide into the cylinders of a gasoline engine except under a certain condition; and that is just before the long trip. As a matter of fact, however, there is a certain hazard connected with the use of this liquid, and that is, extreme oxidization.

Then again there may possibly be a slight acid reaction when this is used. In any event there is danger of pitting the valves and walls of the clylinder. We have had experience in the use of this liquid and find that although it seems to remove carbon slightly faster than water, the difference is so little that it hardly pays to take the chance.

Rocker Arm Knock.

2552

From G. Black, Arkansas.—I have noticed in my model E-45 Buick car a light knock that does not seem to do any harm but remains at all times no matter whether the spark is advanced or retarded. This knock sounds like the pecking of a tack hammer and I would like to remedy it; can you tell me the probable reason for the knock and how to stop it?

Reply.—The knock of which you complain is probably due to the hammering of the rocker arms against the valve stems or the bush rods against the rocker arms. The only way to prevent this is by adjusting the clearance between the valve stems and the rocker arms closer than at present.

Wait until the engine is heated. Turn it over until the first valve has opened and closed. Turn it one-half a revolution further and adjust the clearance until the distance between the valve stem and the rocker arm is only about the thickness of this piece of paper. Be sure that the engine is thoroughly heated.

If you still have trouble after making this adjustment, let us hear from you again and we will advise you further.

A Poor Device.

2553

From V. T. Sutpher, New Jersey.—In a recent issue of one of the automobile magazines I find the description of a home-made attachment for an engine which attaches to the crankcase and is designed to furnish the carburetor with warm oily vapor. The idea seems novel but I would like to know if you think it practical. Do you think it wise to draw the oil vapor from the crankcase through the carburetor into the engine again?

Reply.—We would not advise you to install this device, for the following reason:

In practically every engine the oil base is at all times filled with a vapor composed of air and oil. This vapor ordinarily is not explosive. If used as suggested in your description, and if this vapor were thrown into the carburetor thence to the engine, you would soon find that the cylinders carbonize very rapidly.

We would advise you to read the October number of the Automobile Dealer and Repairer in which are given a number of suggestions relative to the heating of intake vapor.

Batteries and Dixie Magneto.

2554

From H. D. M., North Carolina.—Will you kindly tell me how to connect a set of dry cells with a Dixie magneto for starting purposes

Reply.—There is no way in which you can connect batteries with the Dixie magneto on your present equipment. You will need an auxiliary vibrator system, type A V S, which is sold by the Splitdorf Electrical Company of Newark, N. J., and designed especially to be used with the Dixie magneto in conjunction with batteries. The device costs but little, and we should advise you to investigate it.

You may write to the Splitdorf Electrical Company at the above address or to 5943 Ellsworth Avenue, Pittsburgh, Pa., or 210 North 13th Street, Philadelphia, Pa. In writing this concern be sure to tell them the model number, stamped on the magneto, as well as the number of cylinders it will be used for.



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Cooling a Stationary Engine.

2555

From Charlie Wahl, Colorado.—I have a five horsepower Galloway gasoline stationary engine which I am using to run a feed grinder. The governor is of the hit-and-miss type. Now what puzzles me is, why does the engine require more explosions to keep it going after it has run for awhile than at first when it is cold?

At all times it is pulling the same load, yet the explosions occur much oftener after it has been going for awhile and the water in the system has begun to boil. Why should the water heat so fast? Do you think it is the oil or would you suggest an extra water tank?

Reply.—We should advise you to install a larger water tank or add an extra water tank to the present equipment.

Unless you have had trouble with the burning out of bearings do not change your present lubricating oil. Do not make the mistake in thinking that the heavier oil has more lubricating properties than a light oil. This is not always the case. Your trouble is probably due to the fact that as the engine heats, the cylinders bind the pistons slightly. The only way is to keep the cylinders cooler.

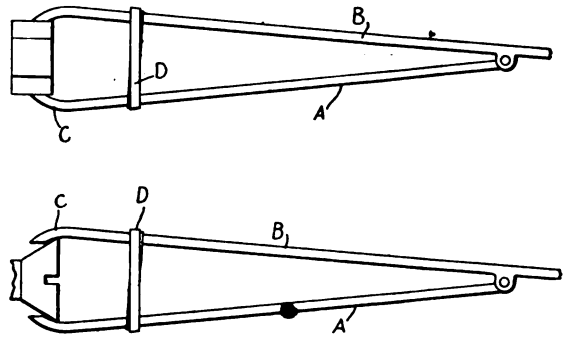
If you like this magazine and feel that it is useful and interesting, the *one best way* to show your appreciation, is to purchase your accessories and supplies so far as possible from our advertisers. Also write to our advertisers for catalogs, printed matter and prices, not forgetting to always mention the fact that you saw the advertisement in the Automobile Dealer and Repairer.

TWO TWEEZER TIPS.

By CHAS. E. DURYEA.

A SLIM cotter pin often can be used as a tweezer. The point can be shaped easily to suit the work at hand. If it needs to be extra good its point may be case-hardened after shaping. It can be sprung to remain closed if it is preferred that way, although to lightly spring open is the usual form.

An old umbrella bow makes a long tweezer, as shown in the sketch herewith, with which screws can be dropped



Two Handy Tweezers.

into inaccessible holes or nuts picked out of deep crank and transmission cases. The brace, A, and the short end of the bow, B, are about the same length, and their ends, C, can be shaped to suit by softening them. A rubber band, D, around them will hold them closed on the article and they can be forced apart by inserting a rod between them. The cost for material is nothing and the time required to make it very little.

NEW AND INTERESTING THINGS IN MOTORDOM

Nation Wide Service to Car Owners.

A few years ago it was a very unfortunate thing, indeed, for a car owner to break his spring—it put his car out of commission for a week or more, until he could order one from the manufacturer.

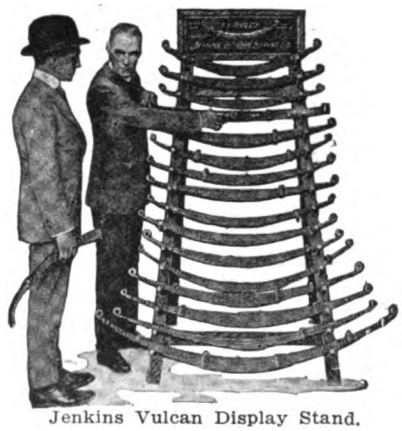
The president of this company conceived the idea of rendering a national service to car owners and dealers by making it possible for every dealer to carry in stock a line of springs for the most popular cars in his vicinity.

The need for a service of this kind was so great that dealers from everywhere responded with orders for springs. Car owners showed their appreciation of the service rendered by Vulcan dealers with increased orders, when in need of other accessories or special services.

So great was the response of dealers that in a few years, instead of one distributing office there are now seven. Under normal conditions each of the seven branches carry a full line of Vulcan springs, ready for immediate shipment to any part of the United States. The company's large factory at Richmond is taxed to its utmost to supply the demands of the trade.

In spite of steel and labor shortage, and the rapidly increasing demand for Vulcan springs, the resources of this company have been such that its dealers have for the most part received the same quick services that have always characterized this business.

By advertising Vulcan springs to the public and trade in periodicals of national



Jenkins Vulcan Display Stand.

circulation, the company has encouraged jobbers and dealers everywhere to carry in stock practically all numbers in the quick selling list. Car owners have seen and heard the expression "Vulcan Springs in Every Town for Every Car." They have responded by moving these springs from the dealers' shelves as fast as they can stock them.

The company provides a spring rack which the dealers can use as a place to keep the springs and at the same time display them to the best advantage. Many of the largest dealers in the country use this rack and assortment of springs as a permanent part of their window display.

The Burke Condenser.

Every automobilist realizes that he must protect his car during the winter from freezing. No matter whether the car is kept in a heated garage or in an unheated one, he must fill the radiator with some sort of a non-freezing solution. Such a non-freezing solution in some cases evaporates and without the owner's knowledge, shortly his non-freezing solution becomes nothing more or less than water, and some fine morning he wakes up to find the radiator a total wreck and the engine jackets cracked because of the ice.

The moral to this story is to protect the freezing solution. Alcohol or kindred fluids when mixed with water make a good anti-freezing solution, but while the engine is

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running there is danger that the alcohol will vaporize and be driven away from the water, leaving the water only. A freezing solution protector is sold by the Automobile Devices Company, 2010 Broadway, New York City, or First National Bank Bldg., Chicago, Ill., or Real Estate Trust Bldg., Philadelphia, Pa., and known as the Burke Condenser.

This device is designed to replace the radiator cap in standard types of radiators and consists of a coil and coil of tubing. As the solution is heated and turns to vapor it travels upward into the condenser but the condenser being open to the air, condenses this steam and the steam drops back again to mix with the water once more, therefore little or none of the solution can be dissipated.

Aside from the fact that the Burke Condenser protects the non-freezing solution it also tends to prevent dissipation of the water itself by the same means. Few motorists realize what this means. A thermo-syphon system to be efficient must be kept filled with water, if only a few pints of the water are evaporated, the system becomes inoperative and the engine may be damaged.

The Burke Condenser conserves this water and obviates the necessity for filling the system frequently. There is still another important factor about the device. Constant addition of water, if it contains any impurities at all, means deposits in the radiator and an overheated engine. By condensing the water the Burke condenser obviates the necessity for adding impurities and new water every few hundred miles. Every automoblist should investigate this time-saving device which offers real insurance to the cooling system.

A Difficult Battery Problem Solved.

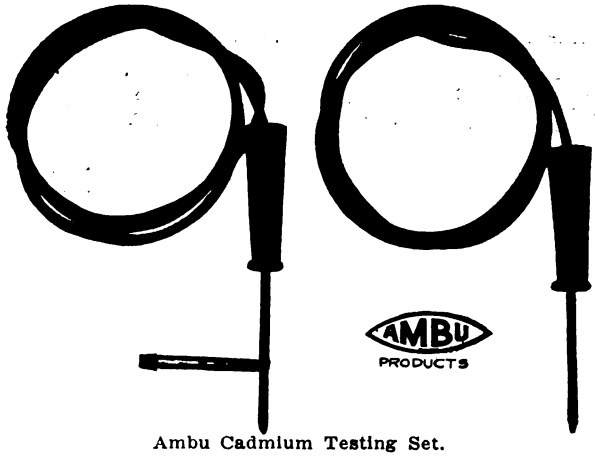
"Very frequently the voltage or gravity of a battery, or both voltage and gravity, may be satisfactory and yet the battery capacity be very low. This is true because either the positive or negative plates may not be charging or discharging properly, and if either does not completely charge or discharge, then the capacity of the cell can only be equal to the capacity of the faulty plates. Under such conditions the voltage will fall rapidly under discharge and the capacity of the battery will be greatly reduced."

Following this paragraph from the book, "The Automobile Storage Battery, Its Care and Repair," is a detailed description of the test by means of the use of cadmium, that can be made of each set of plates, separately, to determine their condition.

To make this examination and test without tearing down the battery is a problem for which every garage man would like the proper solution.

The efficiency of this test has created such a demand for a means of conducting it easily that the American Bureau of Engineering, Chicago, have devised the Cadmium Testing Set, illustrated herewith. It consists of two leads of insulated wires, 5 feet long, attached to two wooden handled brass prods. On one of these prods is attached a piece of cadmium with a rubber tip.

This Ambu Cadmium Test Set can be used either with the Ambu Trouble Shooter or with an ordinary voltmeter if finely calibrated. The set, together with full instructions, is sold for $3 f. o. b., Chicago. The shipping weight is one pound.



Ambu Cadmium Testing Set.

Roller Bearings.

The dealer or garage man who is looking for either Hyatt or Timken Roller Bearings, or New Departure Ball Bearings, should investigate the lines of bearings sold by the Bearings Service Company with general offices at Detroit, Mich., and with branches at twenty-two large cities, and over 750 distributors throughout the country.

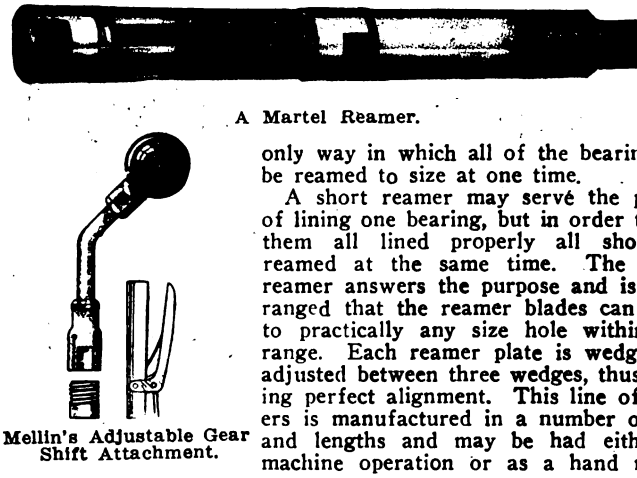
These branches and distributors are carefully placed in the various cities and towns in such a way that but a few hours are necessary to fill the orders from practically any part of the country. Each dealer and garage man who reads our magazine should become familiar with the various branches, a list of which is given in the advertising section of this magazine.

A Driving Convenience.

The fact that there is no adjustment possible in the length of the stock gear-shift lever leads to annoyance and inconvenience in the case of drivers possessed of rather short or rather long arms. This is met and overcome by the Mellin's Adjustable Gear-shift Attachment, a short extension piece, adjustable as to angle and length and with a good-sized ball grip.

This is furnished in styles to meet the varied requirement of different makes of cars. For Dodge, Overland 75-90 and Nash the list price is $1.25. For Buick, Reo, Oakland and all cars having removable ball on top of lever, list is $1.50, while for all cars on which the ball grip is cast solid and is not removable a clamp attachment is furnished and the list is $2.

This device has been on the market for three years and has built up extensive sale. The M. & H. Novelty Co., 857 East 24th St., Los Angeles, are manufacturers, distributing through the jobbing trade.



Mellin's Adjustable Gear Shift Attachment.

Neverleak for Radiators.

This is a liquid compound which it is claimed by the manufacturers will positively stop leaks in radiators. It is a free flowing liquid carefully and scientifically compounded and mixes readily with water. It contains no acid, meal, cement or sediment to clog or impair the cooling system.

It is said that it will stop automobile radiator leaks in from 5 to 10 minutes. It makes a permanent repair by forming a coating on the outside of the break, which coating will dry overnight and is not again soluble by heat, cold, water or alcohol. This preparation also tends to prevent rusting and the formation of scales.

Alcohol may be used as an anti-freeze with this Neverleak, with perfect safety, as one will not affect the other, but one should not use anything else except alcohol. If any anti-freeze article other than alcohol has been used, the water must be drained off and the radiator thoroughly flushed and filled with clean water before putting in Radiator Neverleak. This preparation is manufactured by the Buffalo Specialty Co., No. 1 Hudson St., New York, N. Y., from whom it may be obtained or your dealer can get it for you if you ask him.

We understand that this preparation is sold on an absolute guarantee that it will stop leaks as claimed, or the money will be refunded. Send for circular giving full and further details together with prices.

The Martel Reamer.

Anyone who has occasion to repair engine bearings of either the bronze or babbitt type should investigate the Martel Line of reamers manufactured by the Taft Peirce Mfg. Co., Woonsocket, R. I., one of which is illustrated herewith. The reamer illustrated is designed especially for reaming main and crank shaft bearings in an assembled engine. It is practically the only way in which all of the bearings can be reamed to size at one time.

A Martel Reamer.

A short reamer may serve the purpose of lining one bearing, but in order to have them all lined properly all should be reamed at the same time. The Martel reamer answers the purpose and is so arranged that the reamer blades can be set to practically any size hole within their range. Each reamer plate is wedged and adjusted between three wedges, thus insuring perfect alignment. This line of reamers is manufactured in a number of sizes and lengths and may be had either for machine operation or as a hand reamer.

Greblox.

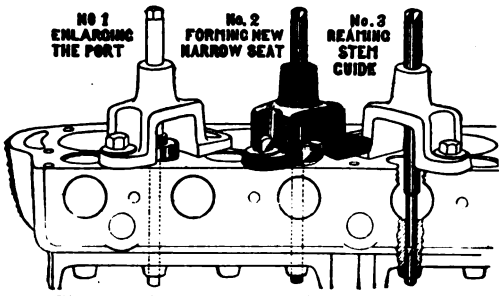
The Greb Company, 197 State St., Boston, Mass., are placing upon the market a product called Greblox; a solder cement which should be in every motorist's tool kit. This cement is a non-conductor of electricity and is said to hold metals, minerals, glass, cloth, wood, paper or practically any material.

It can be used as an insulator in stopping short circuits; it can be used for mending radiators, tools or for repairing tears in upholstery. When thoroughly dry this cement is not affected by chemicals or by water, and is fire-proof.

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Storm Valve Port Renewing Outfit.

Illustrated herewith is an extremely valuable tool manufactured by the Storm Manufacturing Co. of Thompson, Iowa. This machine is termed the Storm Valve Port Renewing Outfit, and as the name indicates it is a complete valve system renewal. Every automobilist knows that his engine cannot be throttled to a low idling speed if air leaks round the valve stems.



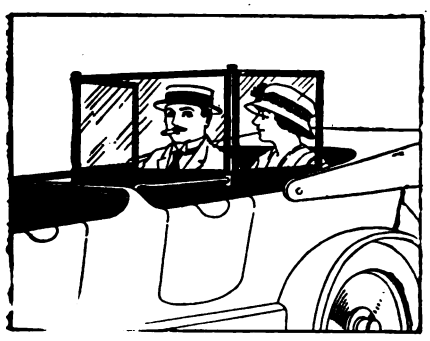
Storm Valve Port Renewing Outfit.

Every owner also knows that he cannot grind the valves satisfactorily if the seats are worn out of round. The device illustrated makes both of these repairs an easy matter. It smoothly reams out the valve stem guide; with another tool in place it enlarges the valve port and forms a narrow seat for the valve similar to that in a new engine.

Fitted with oversized valves the engine block is practically new, as far as the valve system is concerned. Every reader should investigate this appliance. The price is so low that it soon pays for itself in additional power.

The J. H. Tonneau Shield.

We seldom see an automobile on the road today that is not fitted with an ordinary windshield to protect the driver against rain, fog, or snow, yet we often see touring cars driven along the road, the occupants of the rear seat being subjected to wind and dust. Is it not just as important that the rear seats be shielded as the front? A device which may be applied to the back of the front seat is manufactured by the Tonneau Shield Co., Inc., 1779 Broadway, New York City, and termed the J. H. Tonneau Shield.


The J. H. Tonneau Shield In Use.

This device is fastened to the rear of the front seat by means of heavy fittings which enables the occupants to move the shield backward or forward into practically any position, or to drop it behind the seat. For cars that are fitted with a divided front seat, the Tonneau Shield is made in two parts. One part for each front seat. The Shield is handsome and gives an aristocratic appearance to any car.

Beach Rim Tool.

Every owner of a car satisfied with demountable rims knows that there is no fun in expanding or contracting the close split type. The usual method and a very crude one at that is to use a hammer, resulting in permanent damage to the rim, and sooner or later a new rim becomes necessary.


Beach Rim Tool.

The Greb Co., 197 State St., Boston, Mass., has solved the problem by putting on the market the Beach Rim Tool, a device which clamps to both sections of the split rim, and by a movement of the lever contracts or expands the rim, so that the tire can be removed or replaced.

A special proposition is made to jobbers and dealers, and should any of our automobile car owner readers care to try one of these, a ten days' free offer is made.

Important New Motor Books.

Laird & Lee, Inc., Chicago, announce that they have now in press the 1918-1919 edition of "The Modern Motor Car," by Harold P. Manly. It will be issued in one compact volume of 536 pages, large 12mo, with 225 illustrations from detail drawings and photographs and a 24-page alphabetical index, durably bound in flexible keratol, with round corners and colored edges. The revisions and additions bring this standard work up to the very minute, making it a complete, practical and handy reference cyclopedia on all matters connected with the care, repair and upkeep of every type of automobile, old and new.

The same firm have also in hand for immediate publication: "The Farm Tractor—Its Care and Repair," by Wallace B. Blood. This will be uniform in style and size with "The Modern Motor Car," and at the same price, $2.00, postpaid.

The Shaler Vulcanizer.

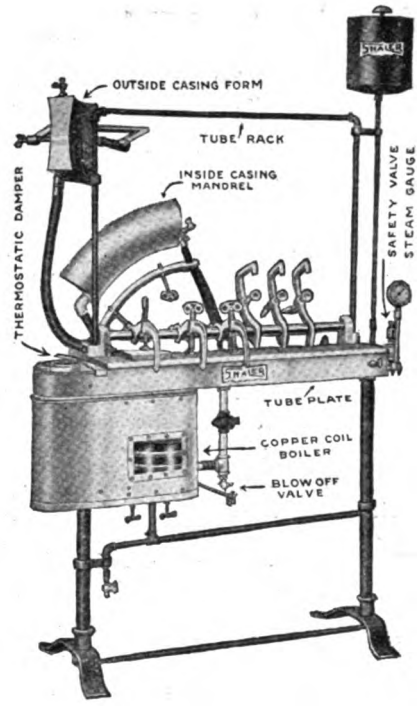
Everyone in the automobile business admits the possibilities there are for big profits in tire repairing. Many repairmen are getting these profits. Others are postponing their start in tire repairing because they have received the impression somewhere that tire repairing is a mysterious, difficult art to learn or that the necessary equipment is exceedingly expensive.

Right now is the time to give tire repairing serious consideration. The high cost of tires and the possible scarcity of them is filling motorists with a desire to have repair after repair made until the last possible mile of service has been obtained.

One of the types of tire repair equipment that is especially adaptable for the small garage that wants a simple, inexpensive vulcanizing plant, as well as for the repair shop that demands reliability and large capacity is the Shaler Type NPR No. 41, illustrated herewith. There is ample capacity for handling about 200 tubes and a dozen casings daily. Any type of repair that is practicable with any vulcanizer can be handled, from tube punctures to the largest casing blowouts. By the use of the Wrapped Tread Method, adopted from the method used by most tire manufacturers in making tires, the repair of casings is reduced to the simplest terms. And all sizes and kinds of casings are mended with one set of moulds.

Great economy of repair material is secured by the elimination of cutting away and replacing a section of the tire as is often done by repairmen, and at the same time a stronger repair is made than when the tire is weakened by cutting into sound fabric. A 50 per cent saving in time of curing is accomplished by heating the tire from inside and outside at the same time.

This vulcanizer is heated by steam generated by a gas or gasoline burner. One of the outstanding exclusive features which have made it standard throughout the world is the automatic control of temperature by means of a thermostat. It is impossible to overcure or undercure a tire and no attention needs to be given to the vulcanizer while it operates as the temperature cannot vary from the correct degree.



A Shaler Vulcanizer, Type NPR No. 41.

C. A. Shaler Co., Waupun, Wis., also make many other models for repair shop use and a line of motorists' emergency vulcanizers which are among the best selling accessories on the market and are handled by practically every jobber.

Bearing Replacement.

Only a few days ago a subscriber came into the office and asked where he could obtain a new bushing for a certain well-known car; he said that none of those parts could be obtained at any service station in New York and that the factory was slow on deliveries. We asked him why he did not use a cored bar of bronze and make the bushing himself in a few minutes. He did not know that he could obtain such a product.

How many readers have waited weeks for a repair bushing? How many of them

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realize that they can obtain cored bronze bars, especially made for bushing and bearing purposes?

Yet the Bunting Brass & Bronze Company, 740 Spencer St., Toledo, Ohio, make a specialty of this product. With a little machine work, a cored bronze bar can be made into a perfect bearing, no matter whether the shaft or the casing is worn large or not.

In many cases a stock repair bushing will not fit because of wear in the shaft or housing. Replacement of either the



A Bar of Bunting Bearing Bronze.

shaft or housing means an investment of considerable money, yet a new bushing can be made from cored bars with but little trouble and much less cost.

Every repair man who makes many bearing replacements should investigate this product.

Ball and Roller Bearings.

At the present time when stock parts and bearings are so hard to obtain the car owners and repair men are often unable to replace special bearings in the automobile, and so the car is driven with a worn part which sooner or later damages the other parts of the machine. Anyone who has cause to replace bearings of either the Ball or Roller type should correspond with the Columbus Sales Company, 1777-1779 Broadway, New York, who carry in stock practically all of the standard makes of bearings in any sizes and types. In writing for prices be sure to tell the name of the model of the car, and the part upon which the bearing is to be used.

Standard Motor-Pep.

How can I get satisfactory power from my engine? How can I obtain high mileage per gallon of fuel? How can I reduce the excessive carbon deposits that bother me all of the time?

Doubtless you have asked yourself all of the above questions at some time or other, perhaps you have even sent us a letter containing one or more of them, for we receive many such inquiries every week.

If you want an answer to any of them we advise you to try a sample of Standard Motor-Pep, marketed by the Utilities Co., 310 Citizens Bldg., Cleveland, Ohio. A product that is giving satisfaction.

Standard Motor-Pep is a scientifically prepared compound, in tablet form, that gives gasoline that so-called "pep" which means a snappy and powerful engine only obtainable heretofore with high-test gasoline. It is dissolved in the gasoline and it is said that gasoline so treated gives nearly 15 per cent more mileage.

Every reader should investigate this product, a sample package large enough to treat 100 gallons of gasoline can be had at a very low price.



A Vise for Many Uses.

There is nothing to warrant the belief that the labor shortage will be immediately relieved with the ending of the war. The garage mechanic will continue to be hard pressed for time in getting out work. But in any event, time- and labor-saving tools and repair equipment will always hereafter be considered indispensable toward complete shop efficiency.

Take vises. How often must the shop mechanic handle a piece of work with an ordinary vise that is permanently attached



Fig. 1.



Fig. 2.

to the work bench? The removable and portable vise is now found in most every well-managed repair shop.

The "Yankee" Vise, No. 1993, shown herewith, is not only removable from its base, but it is square finished, on sides, end and bottom.

The work is trued up once and can then



Fig. 3.

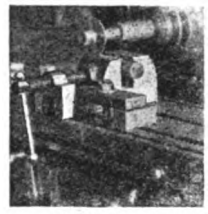


Fig. 4.

be carried through half a dozen operations without removing it from the jaws of the vise. No resetting is necessary.

In the first illustration we see a steel cylinder locked in a "Yankee" Vise, No. 1993, and placed squarely on surface plate for accurate center marking.

The vise is then put back on its swivel base (bolted to bench), where with set screw and cam-throw lever it can be locked securely in any position for center punching, as shown in Fig. 2.

Then vise and all are carried to the drill press, assuring a true-drilled hole every time, as at Fig. 3.

Still gripping the work firmly, the vise is then used on bed of milling machine, as shown in Fig. 4.

During all the operations the work remains in original alignment A separate grooved steel plate; for firmly holding round and irregular pieces in any position, comes with each vise of this model.

Any mechanic will see how this handy tool saves time and assures an accurate job as well. It's the kind of tool that the mechanic enjoys working with; that is sure to make him more valuable to himself and his employer.

And this is only one of the numerous special feature "Yankee" Tools made by North Bros. Mfg. Co., Philadelphia.

At the I. O. M. A. Convention.

It has been said that the most complete display of gasoline and oil hose ever made was in the space, booths 28, 30 and 32, of the Metal Hose & Tubing Company, Brooklyn, N. Y.

All sizes of the special hose, Triplexd, produced by this manufacturer, were shown in a great variety of complete lengths with fittings, and cut sections demonstrating the construction.

A monster loading hose such as the government ordered for tankers had the place of honor in the center and a standard, displaying the filling station hose in all sizes, stood near it.

There was a full display of large size loading and unloading hose, tank car and tank wagon hose, and filling station hose for every requirement.

Among the attractions was a length of Triplexd Gasoline Hose, sold over three years ago and in use by the purchaser for three years, which was in such excellent condition as to warrant the claim that it still was very serviceable.

There were demonstrations of the flexibility of the hose, adjustment of the connections, and other details interesting to users of gasoline and oil hose. A sufficient staff of salesmen was in attendance to promptly care for all inquiries.

Among the pump and tank makers who exhibited, five of the six, or 83 per cent. displayed Triplexd Gasoline Hose as standard equipment on their products.

Superior Ignition Parts.

The excellent results that the trade have obtained in the use of Superior ignition repair parts and motor-generator brushes is ample proof that these articles are all that their name implies. In producing Superior parts, etc., the manufacturers make no attempt to compete with the many low-grade parts with which the market is flooded, and which have been turned out with no regard whatsoever as to what the ultimate results would be when such products are used.

They have merely been made to sell at a price. It is no wonder that the Specialty Manufacturing Company has shown such remarkable growth in the past two years, when it is considered that their Superior parts, etc., are in every way equal, and, in some cases, better than the original equipment.

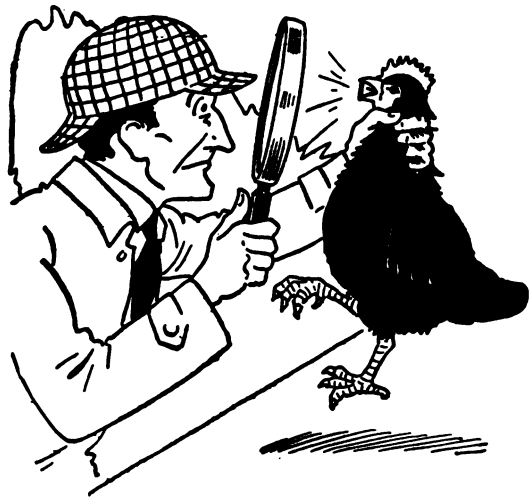
They use no composition or alloy metals in any of their contact points, which are all made of pure platinum or pure tungsten as the case may be.

Motors and generators can also be rendered decidedly inefficient if the proper grade of brushes are not used, and for this reason the company has made extensive laboratory tests and experiments to determine just exactly what grade of stock is best suited for each of the many types of starting motors and lighting generators on the various cars, and for this reason perfect results are assured when Superior brushes are used.

Deliveries, particularly during these strenuous times, are of utmost importance, and this company seems to have solved this problem, as all orders are invariably shipped on the same day as they receive them. This fact is, of course, of great importance to the trade at all times.

The prices of this line of merchandise are exceptionally low, and are fully set forth in the new catalog of the Specialty Manufacturing Company, 641 Massachusetts Avenue, Arlington, Mass.

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As scarce as hen's teeth

The shortage of carburetors is becoming more apparent daily. All manufacturers are affected about alike—labor and material both very scarce—war orders getting preference in OUR factory.

Yet the public needs more good carburetors. The dealer who buys Rayfields now is the man who will have them to sell—the man who doesn't buy now can only offer excuses.

First come, first served.
Order now.

Service stations and dealers everywhere.

Findeisen & Kropf Mfg. Co.
21st and Rockwell Sts., Chicago

RAYFIELD CARBURETOR

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Valve Refacers.

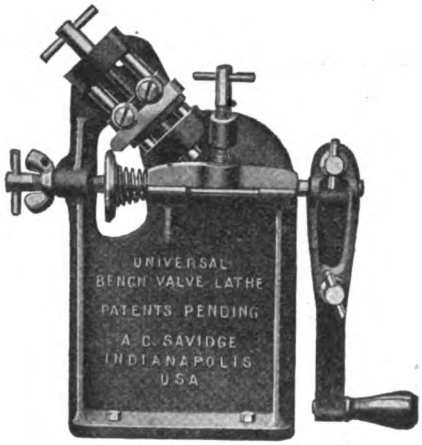
No part of the engine is more essential than the valves. An engine may be in good condition in every way, but if the valves do not fit properly and permit the gas to pass through then the engine itself will not



Savidge Junior Valve Lathe.

give satisfactory power. As a matter of fact there is great danger in permitting an intaking valve to leak. A back fire might result and the carburetor would explode.

The average owner has the idea that by regrinding his valves they can be brought into condition again, but this is not true. If a valve has been reground a certain number of times its surface is gone. It may be worn oval or it may lose its proper angle. To grind it any further might result in severe damage to the engine block and so the valve should be resurfaced. To do this a lathe is necessary, and A. C. Savidge of Indianapolis, U. S. A., manu-



Savidge Bench Valve Lathe.

factures two valve lathes which may be operated by hand and purchased at an extremely low figure. The first is termed "Junior" and is much lighter than the second one. Both lathes are adjustable in all ways, and it is claimed that a perfect surface upon the valve can be had with a minimum amount of effort.

Automobile Brushes.

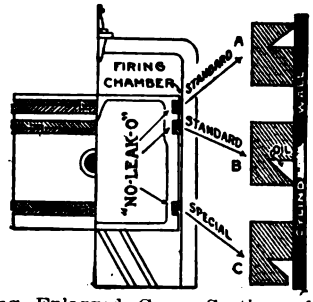
Whether the repair man or garage owner is looking for a paint brush or for a special form of washing or dusting brush for the automobile, he should be sure to send for illustrated literature showing the line of brushes put out by John L. Whiting-J. J. Adams Co., Boston, Mass. These brushes are made by a special method which retains the toughness of the bristles yet gives them a softness and elasticity which makes the quality.

The bristles and hairs are held in a piece of the best quality rubber, and it is claimed that there is absolutely no way in which the bristles can be pulled out. This should be of special interest to the automobile painter or varnisher who knows that a brush that sheds its hair takes more time than the painting.

Then again, one who washes automobiles should be particularly interested in the washing brushes, for the reason that no matter how warm the water there is no danger of the brush shedding its bristles.

A Piston Ring That Don't Leak.

As a solution to the problem of avoiding kerosene precipitation into the crank case with subsequent lubricant dilution, the No-Leak-O Piston Ring Co., 824 W. North Avenue, Baltimore, Md., have a special type of piston ring that they have developed, so installed that the top ring provides a groove with a square edge to catch any kerosene attempting to pass. This is pushed up on the compression stroke. After



Showing Enlarged Cross Section of Piston with No-Leak-O Rings Applied.

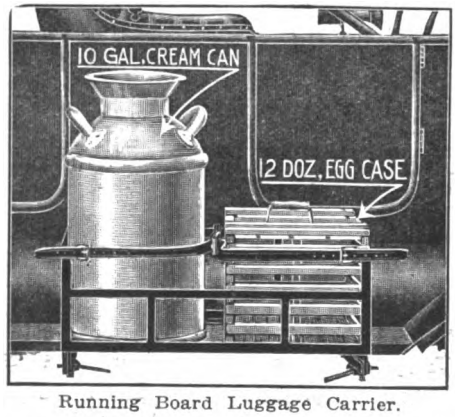
the explosion, or when the piston starts down, this refuse is carried out of the groove by capillary action into the firing chamber just after the explosion, when it is the hottest, and the kerosene is then vaporized and exploded, or ejected with the exhaust, and not into the oil pit.

Gas cannot be controlled or held in the firing chamber except by a seal of oil. Oil cannot be held down and adequate lubrication provided, except by a seal, or dam against the oil. These are the principles adopted in this "No-Leak-O" Piston Ring, rather than try to accomplish similar results solely by perfect fit, flexibility, etc.

Readers may write direct to the above company, mentioning this paper, and secure further details of the "No-Leak-O" Piston Ring, which, indeed, seems practical.

Running Board Luggage Carrier.

It is very evident that the farmer of today has begun to realize that his automobile is not only a passenger car but a business vehicle. In rural communities one



Running Board Luggage Carrier.

often sees the automobile being used as an express wagon—the tonneau crowded with provisions or products, the running board loaded with cases, and frequently articles are strapped to the fenders themselves.

H. G. Paro Co. of 1410-14 South Michigan Blvd., Chicago, Ill., are placing a product upon the market which deserves special mention. It is known as the Ekern's Running Board Carrier; a fitting especially designed for farmers in which they can carry cream, eggs or other products to the market without injury to their car. The carrier is 28 inches long, 14 inches wide and 9½ inches deep. It has a space for two ten-gallon cream cans, two egg cases or one egg case and a cream can.

It is fitted with two heavy straps and is designed to clamp firmly upon the running board. It is finished in black enamel and weighs about 18 pounds. Dealers should write for prices, as this seems to be a particularly interesting proposition and offers ready sale.

The Victor Heater.

Now that winter is fast approaching and there is frost and chill in the air, the automobilist who intends to use his car during the fall and winter months, as well as in the early spring, if he cares to be comfortable, should write the Foreign & Domestic Auto Supply Co., 1765 Broadway, New York, for their product—the Victor Heater.

This device is designed to fit into the floor of the car, the only part protruding above the floor being a thin metal casting. The lower part of the heater, which contains baffle plates and passages



The Victor Heater.

for absorbing the heat, extends below the floor. To this part is connected the exhaust pipe from the engine and at the other end is connected the muffler pipe.

The hot exhaust from the engine heats the various surfaces of the heater, and a warm current of fresh air is carried up through the heater itself. None of the exhaust gases escape into the car, so that the device can be used very successfully in closed cars of all types.

Not only does the device serve to warm the car, but it also acts as a ventilator, furnishing a steady current of warm fresh air through it. The price is exceptionally low and within the reach of every automobilist. Our readers are invited to write for further details to the address given above.

McCormick-Allmand Weatherstrip.

Aside from the fact that moisture, snow, or fog collects upon the outside surface of the windshield, much of the trouble is caused by the water leaking in between the two parts of the glass at the joint, and running down the inside of the shield. Every automobilist who owns a divided windshield should investigate the McCormick-Allmand Weatherstrip marketed by the Robinson Manufacturing Co., 503 Lincoln Bldg., Louisville, Ky.

This Weatherstrip is made of the best quality rubber and designed for practically any thickness of windshield glass. In writing for prices be sure to state the thickness of the glass, and the type of windshield. Special dealers' proposition is made by the concern.

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CORK INSERT



A big success

—because it has made good on hundreds of thousands of Fords

Why has Cork Insert made good in such a big way? What makes it work so smoothly? Simply this: The cork buttons provide *improved* friction. The powerful high-grade fabric carries the load.

It isn't the cork—It isn't the fabric It's the COMBINATION

in the patented Cork Insert way—that has made Cork Insert the big success that it is.

Cork alone hasn't the strength for transmission lining usage. Fabric alone lacks frictional qualities. It glazes down too quickly, causing grabbing, slipping, chattering.

But Cork Insert has the ideal combination of STRENGTH PLUS FRICTION. When you apply the brake, the corks come into contact with the brake drum first. They compress gradually and ease the load down to the fabric. The light pressure required, and velvety smooth action of the buttons of cork coming in contact with the drums, mean such long wear that Cork Inserts are far the cheapest in the long run.

Be sure you buy Cork Insert

Remember the name and see that you get it. It is sold in a red and black box with the name "Cork Insert" in big letters.



$3 per set of 3
Rockies West, $3.25
Canadian Price, $4.50

Advance Automobile Accessories Corp.
Dept. L5-1, 56 E. Randolph St.
CHICAGO, ILL.



$1
for 1917-18 Fords
85c for 1916 and earlier Fords
Canadian Prices: 1917-18 model, $1.50—earlier model $1.25

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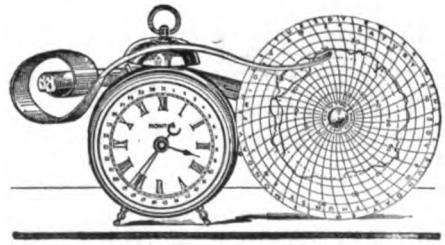
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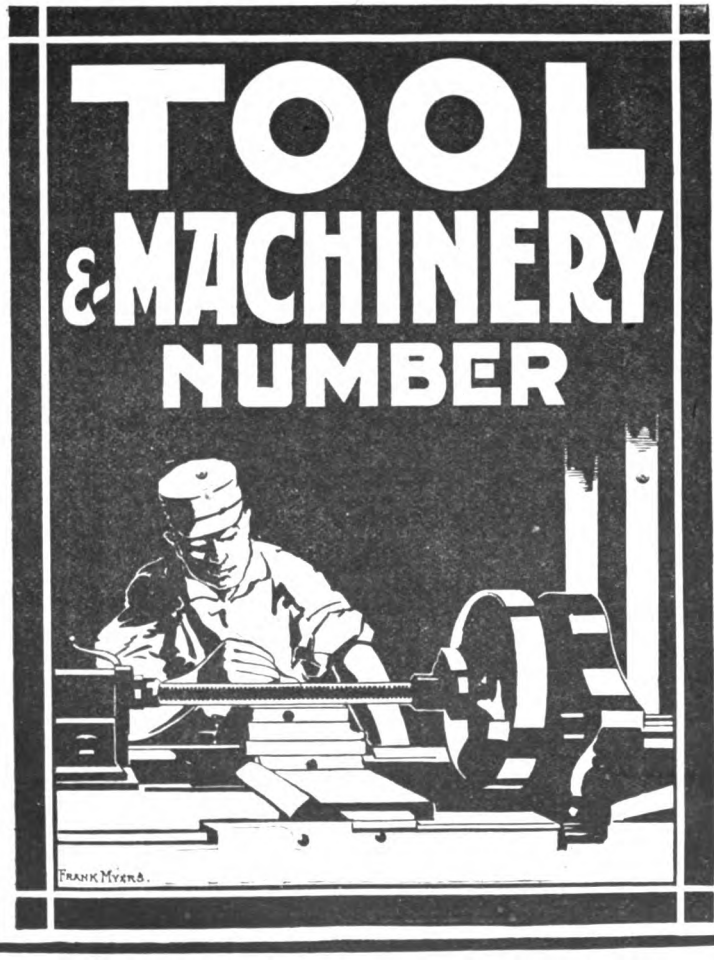
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Even a few thousands of an inch wear is sufficient to reduce the power and cause excessive carbonization. When this happens cylinders should be reground or rebored. In case of scores the groove should be refilled or rewelded. To any of our readers who are troubled with any of these annoyances we would suggest that they write the Bridgeport Piston Ring Co., Third Street at Connecticut Avenue, Bridgeport, Conn., who make a specialty of regrinding cylinders of silver soldering scores, and refitting pistons and rings. These people are specialists in this line of work and have had extensive experience.



The Regular December, 1918, Issue
—of the—
Automobile Dealer and Repairer
WILL BE A
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This issue will be largely devoted to practical advice and instruction for Repairmen and Garagemen on Tool and Machinery Shop Equipment. It will be the first number of the kind we ever brought out and

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Your full page advertisement ought to be in this number. Regular rates for space—Final forms close December 5th, but if you wait till then it will be too late for best service. Our copy man would like to get you out good copy, appropriate for the great business drive which is bound to come with

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Size	Plain	Non-Skid	Size	Plain	Non-Skid
28x3	$4.50	$5.00	35x4	$10.00	$11.00
30x3	5.50	6.00	36x4	10.00	11.00
30x3½	6.50	7.75	34x4½	11.00	12.00
32x3½	8.00	9.00	35x4½	11.00	12.00
31x4	9.00	10.00	36x4½	11.00	12.00
32x4	9.00	10.00	37x4½	11.00	12.00
33x4	9.00	10.00	35x5	11.00	12.00
34x4	10.00	11.00	36x5	12.00	13.00
			37x5	12.00	13.00

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72—30x3½	7—34x4	5—37x4½
2—31x3½	25—35x4	5—35x5
32—32x3½	18—36x4	15—36x5
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30x3	5.50	6.05	2.00
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32x3½	7.15	7.70	—
34x3½	8.25	8.80	3.00
32x4	9.50	10.50	2.75
33x4	9.50	10.50	3.25
34x4	9.80	10.80	3.50
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For (non-skid) sizes up to 32x4, 50c extra; all other sizes $1.00 extra.
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35x4½	11.00	12.10	4.10
36x4½	11.00	12.10	4.25
37x4½	12.10	13.20	4.35
34x5	11.00	12.10	4.50
35x5	13.20	14.30	5.00
36x5	13.20	14.30	5.00
37x5	13.75	14.85	5.00

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PATENTS SECURED—C. L. Parker, Patent attorney, McGill Building, Washington, D. C. Inventor's Handbook upon request.

RALPH N. FLINT, M. E.—Attorney-at-law in Patent Causes, late Assistant Examiner Internal Combustion Engine Division, U. S. Patent Office. Specialist in Internal Combustion Engine Cases. 2 Rector Street, New York, N. Y.

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STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912, OF AUTOMOBILE DEALER AND REPAIRER, published monthly at New York, N. Y., for October 1st, 1918.

STATE of New York } ss.
COUNTY of New York }

Before me, a notary public in and for the State and county aforesaid, personally appeared Frank R. Whitten, who having been duly sworn according to law, deposes and says that he is the business manager of the Automobile Dealer and Repairer, and that the following is to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 443, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are:

NAME OF—

Publishers—Motor Vehicle Publishing Co., 71-73 Murray St., New York City, N. Y.

Editor—M. T. Richardson, 71 Murray St., New York City, N. Y.

Managing Editor—M. T. Richardson, 71 Murray St., New York City, N. Y.

Business Managers—F. R. Whitten, 41 Pinehurst Ave., New York City, N. Y. M. T. Richardson, 71 Murray St., New York City, N. Y.

2. That the owners are:

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STOCKHOLDERS—M. T. Richardson, 71 Murray St., New York City, N. Y.

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A. J. Richardson, Ridgewood, N. J.

Cornelius Doremus, 66 Broadway, New York City, N. Y.

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Mrs. Harriet L. Johnston, New Rochelle, N. Y.

3. That the known bondholders, mortgagees and other security holders owning or holding 1 per cent. or more of total amount of bonds, mortgages, or other securities are: None.

4. That the two paragraphs next above giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company, but also in cases where the stockholder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear on the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds or other securities than as so stated by him.

MOTOR VEHICLE PUBLISHING CO.,
Publishers,
Automobile Dealer and Repairer.
F. R. WHITTEN, Business Manager.

Sworn to and subscribed before me this 26th day of September, 1918.

ROBERT F. W. SCHMIDT,
Notary Public.

(SEAL)

(My commission expires March 30, 1919.)

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AS A TIME SAVER IN BOOSTING CUSTOMERS THROUGH MORE BUSINESS AND MORE MONEY

Don't take off the Crank Case to weld a broken arm—it costs too much—altogether about $25.00. Use this arm next time she breaks. Jack up the motor, bolt on the arm and in 15 minutes the job's done.

IN STOCK WITH DEALERS AND JOBBERS IN THE UNITED STATES AND CANADA

If your jobber's name is not here, tell us. We will wake him up—or try to.

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HUDSON MOTOR SPECIALTIES CO., 1932 Arch St., PHILADELPHIA, PA.

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The Secret of Steer Warms —The Brass Plate

The reason why Steer Warms make good, and will continue to make good for years, is based on the brass plate. The body of Steer Warms is composed of a heavy brass plate which does two things—first, it protects the resistance wire, and second, it acts as a conductor to hold and distribute the heat over the whole surface of the Steer Warms. The leather on top of the brass plate holds the heat in, but lets it out through the holes that are covered by the hand when holding the wheel. In this way, the greatest amount of heat radiation is obtained with the least amount of heating surface and the least use of electric current.

SteerWarms

Can Be Guaranteed to Your Customers

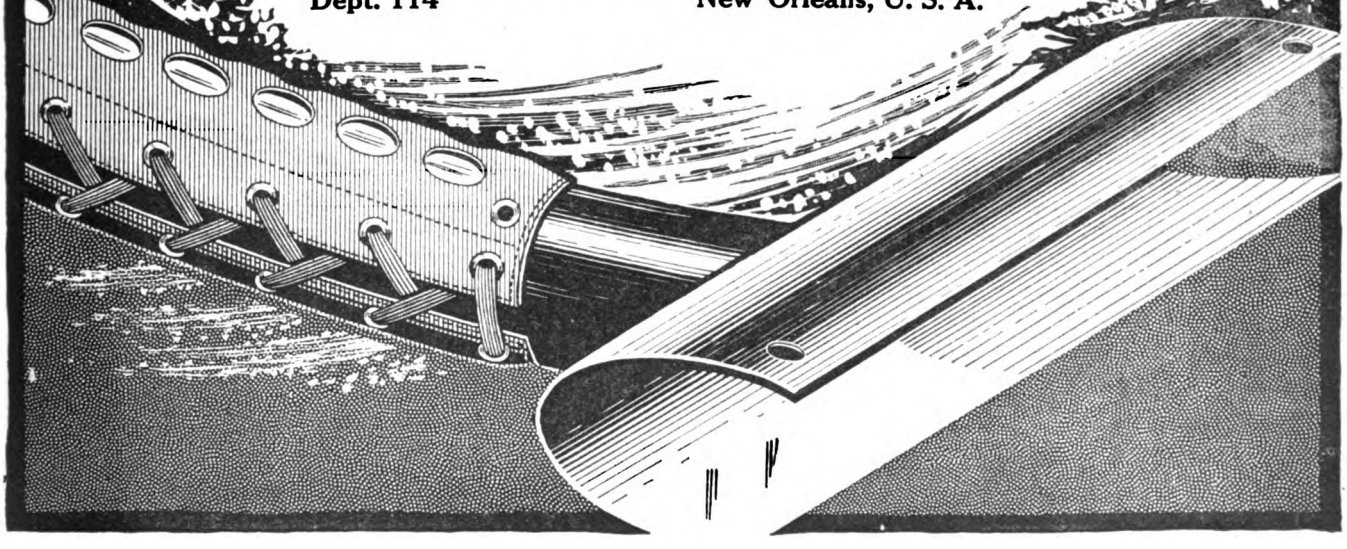
Because Steer Warms are so securely made they will not wear out. Many of them have been in use for years and they are still as good as ever. We guarantee them for five years against burn-out, but they will last much longer. Remember that in using Steer Warms there is absolutely no chance of a shock. They will not injure the other electrical connections; there is no chance of grounding; they won't injure the battery and they are very easy to install. Send in your stock order today to your jobber.

Special Offer

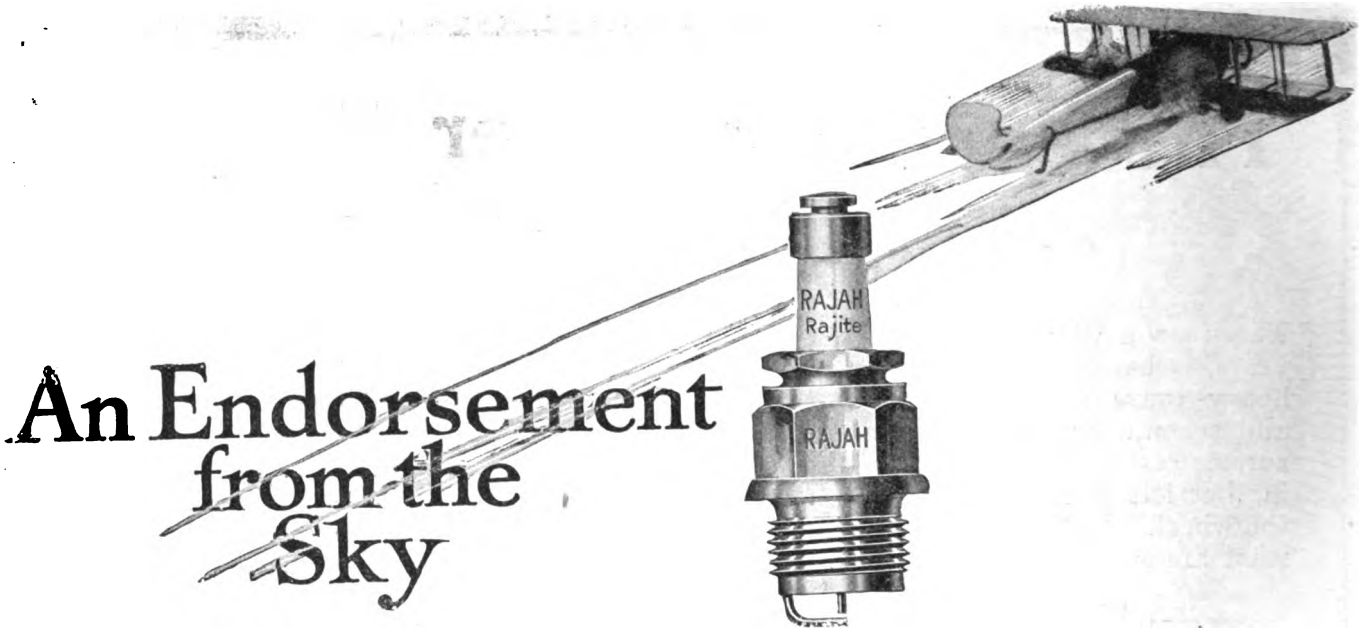
Write for our special offer to dealers who will push Steer Warms this year. We supply liberal advertising materials. Ask how you can make money on Steer Warms. Write today.

Interstate Electric Company

Dept. 114 **New Orleans, U. S. A.**



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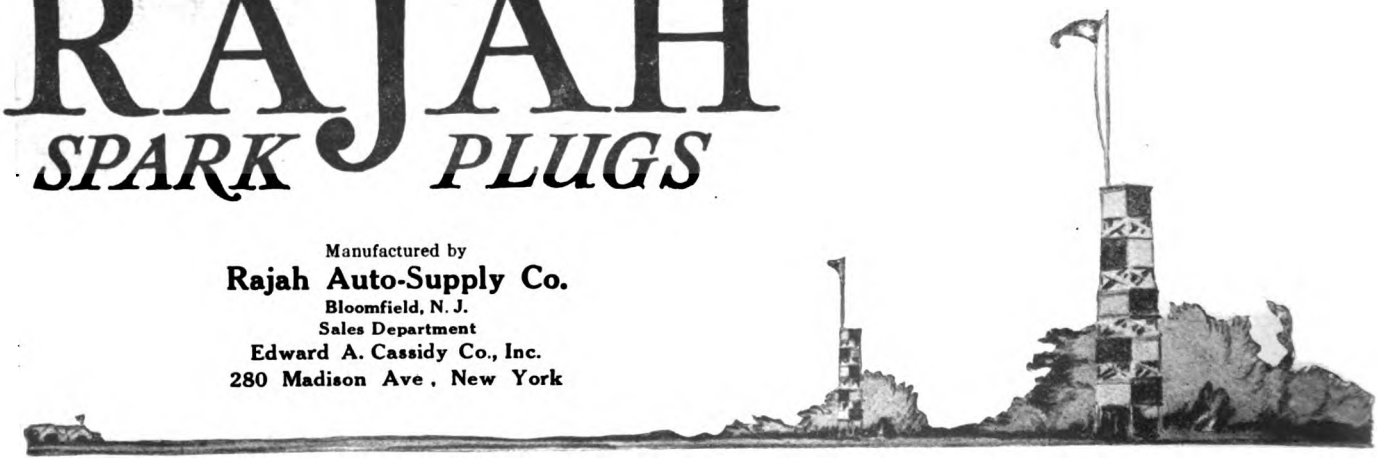


An Endorsement from the Sky

On September 18th, 1918, at Dayton, Ohio, Captain R. W. Schroeder established the world's altitude record of 28,900 feet, flying a Bristol plane, with a 300 H. P. Hispano-Suiza motor equipped with

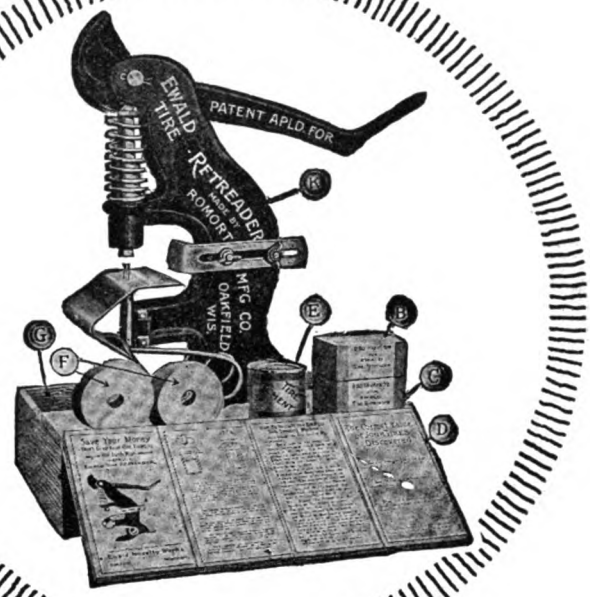
RAJAH SPARK PLUGS

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How would YOU like to make $25 per day or $625 per month more?



TRADE MARK Ewald

Tire Retreader Outfit

A. Retreading Machine
B. 250 Special Staples, ½" long
C. 250 Special Staples, ⅝" long
D. Full Sheet of Directions
E. 1 Can Tire Cement
F. 2 Rolls Rubber Reliner
G. 1 Shipping Box

Price complete as shown, $15.00

If you have your eye on the dollar sign and you are alert and eager to increase your business, and thus make larger profits, the EWALD TIRE RETREADER OUTFIT points the way.

You can easily staple 10 tires a day with the EWALD TIRE RETREADER and make $2.50 per tire.

Would you like to make $25 per day or $625 per month?

This is the BIG chance for the tire repairman, and we want to help you get YOUR share!

Every garageman, repairman and tire repair shop needs it!

Further particulars on request.

Factory Sales Department

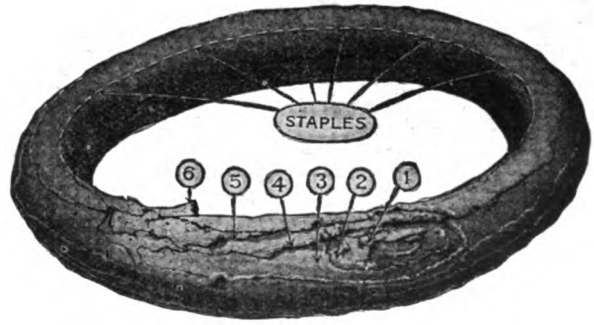
THE ZINKE COMPANY

1325 S. Michigan Avenue - - CHICAGO, U. S. A.

Manufacturers

ROMORT MFG. COMPANY

OAKFIELD, WIS. CHICAGO, ILL.



The above tires were stapled by the Ewald Tire Retreader and then run over two thousand miles. You can see the fabric at 1, 2, 3, 4, 5, and 6 as it wore away, but not a single staple pulled out.

Please mention the Automobile Dealer and Repairer when writing to advertisers.

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A SURE SIGN of carbon is a smoky exhaust, due to lubrication getting *past* the piston rings up into the combustion chambers where it *burns*. Leaky piston rings waste as high as 25% gasoline —one drop in four.

HI-COMP PISTON RING

"THE RING THAT MAKES THE MOTOR SING"

are the best gas-tight rings for overcoming engine troubles due to carbon—knocking, skipping, faulty ignition; valve pitting, wearing down of cylinder walls, piston and piston rings; smoky exhausts.

Hi-Comp Piston Rings are made from two perfectly balanced perfect eccentric rings into one absolutely gas-tight concentric ring. Each ring ground under oil — not buffetted — to preserve the true temper of the secret process gray iron and ensure high polish and gas-tight fit. Won't wear cylinders out of round — *proof* of gas-tightness. Make reboring of average cylinders unnecessary — an exclusive Hi-Comp advantage. Hi-Comp Piston Rings deliver every ounce of power from every drop of gasoline on to the piston head— no power or oil can get past them!

It will pay you to install Hi-Comp because of the satisfaction they give to you and your customers. Fully guaranteed by an old established piston ring company to give MORE POWER on less gasoline and oil. Write for booklet, specification chart and details of 90-day trial guarantee

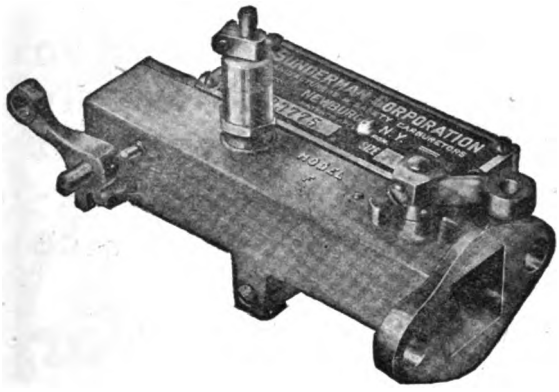
The Continental Piston Ring Co., Memphis, Tenn.

The Ring that Makes the Motor Sing

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SUNDERMAN

Vacuum Carburetor



Model F **$7.50**

For Ford, Metz and Saxon Four

Model BB—for all other cars—without connection..... $10

With regular connection..... $12

All prices F. O. B. Newburgh, N. Y.

Insures Easy-Starting In Winter

And Saves From 30 to 50 Per Cent of Your Gasoline

THE sharp days and cool nights of Autumn emphasize right now the need for easy starting.

There's no job meaner than cranking away at a motor that's been chilled by standing idle in cold weather. Even in October many cars—particularly Fords—refuse to come to life without priming.

Install a Sunderman—and Forget Starting Troubles

The Sunderman is an easy-starting carburetor in all weathers, in all climates and in all altitudes. Our tests have proved to us that it is the easiest-starting carburetor of any of the great variety that have come under the notice of our service-station experts.

No matter how chilled the motor—short of a frozen radiator—all you have to do is pull on the "choker" and crank as you would in July. Those instructions are the same whether you have a self-starter or you start it yourself by muscle-power.

Its Quick Starting Feature Alone Will Sell the Sunderman

If you will demonstrate this feature, Mr. Dealer, you will multiply your Sunderman sales many times over this winter. Nothing else that you can sell a car owner can make the same appeal or add so much to his comfort and convenience as a carburetor that will start his car in cold weather, *quickly*. The Sunderman Carburetor does *that*—all that is necessary is to follow the simple instructions that accompany every carburetor we sell.

And It Saves Your Gasoline at the Same Time

The reason for the quicker starting of our carburetor is the same as that for the increased power it gives—a *finer* vaporization—a better, more quickly and powerfully explosive admixture of gasoline and air.

The Sunderman mixture is a triumph in the science of carburetion—because it gives more power while it saves. The saving is automatic. Every bit of gasoline is broken up more finely and gives more power. This break-up and the greater power that follows result in a saving in gasoline that we positively state is from 30 to 50 per cent. It is more on some cars.

Car Owners—Send us an order at once. State the make and model of your car and we will give you instant service.

DEALERS: Start Selling and Pushing This Carburetor At Once

Sunderman Corporation, 13 Chambers St., Newburgh, N. Y.

PACIFIC COAST BRANCH: 593 MARKET ST., SAN FRANCISCO, CAL.

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The "Y" and the WAR

When an officer said to Elsie Janis at the close of an entertainment in a Y.M.C.A. Hut: "You have kept my men from thinking of tomorrow's battle; they will fight better because of tonight," he expressed the big, underlying purpose of the Y.M.C.A. work. In other words, the

Y.M.C.A. is Helping Win the War

The Y.M.C.A. of wartime is vastly different from the Y.M.C.A. as most people know it. Its work has assumed tremendous proportions and achieved tremendous results. It is supplying a vital need—one that is not supplied in any other way. Its work is as important as that of any other organization which the war has developed.

Those of us who are bearing the lighte part of this great war burden must realize that it is not enough to raise and train an army. It is not enough to feed and clothe our men. It is not enough to care for those who are wounded. Soldiers are people, not machines. They must be kept mentally fit to make them efficient.



2,500,000 letters are written every day on "Y" Stationery

It has been demonstrated—is being demonstrated all the time—that the nation gives freely for the building of ships, for the manufacture of munitions, for the housing, clothing and feeding of our fighting men and for providing medical aid to those who are wounded. It will give just as freely when it understands that without the games, shows, stores, reading, educational courses and home comforts which the "Y" provides, all this other giving will be futile.

Consider yourself in relation to your own work. Suppose you were taken from your job, removed to another town and put to work. Suppose at the end of each day's work you ate your supper, went to bed, got up in the morning, had your breakfast went to work and kept this up for weeks and months—nowhere to go in your idle time; nothing to do; no friends who cared about you. How long could you keep it up? How long could you do your work? That would be the soldier's life without the "Y."

Somebody said, "beware of the army that sings." Armies do not sing in response to orders. They do not sing because of the joy of fighting. They sing because their spirits are high, because they are mentally, morally and physically fit; and it is this condition of mind and body, this building up and maintaining of the morale of our men, which is the deciding factor between a victorious and a defeated army.



Everything is free in the front line canteens

Four allied activities, all endorsed by the Government, are combined in the United War Work Campaign with the budgets distributed as follows: Y.M.C.A., $100,000,000; Y.W.C.A., $15,000,000; War Community Service, $15,000,000; American Library Association, $3,500,000.

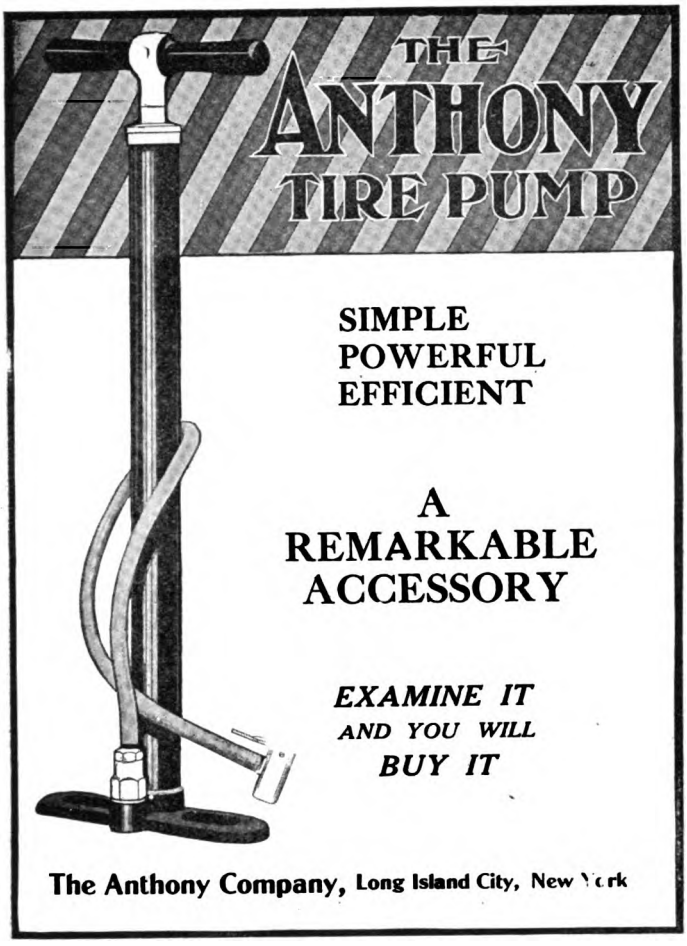
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THE ANTHONY TIRE PUMP

SIMPLE
POWERFUL
EFFICIENT

A
REMARKABLE
ACCESSORY

EXAMINE IT
AND YOU WILL
BUY IT

The Anthony Company, Long Island City, New York

A Tire That is Puncture Proof



The Result of Ten Years' Testing

After these ten years of experimental labor and crucial tests our efforts have been rewarded. The results are that the **Brictson Tire** is proving itself a revelation to the motoring world.

It Solves the Tire Problem

Because it is—puncture proof, blowout proof, skid proof, rut proof, rim-cut proof, oil proof, gasoline proof, trouble proof.

10,000 Miles Guaranteed

Can you beat that? Many motorists will say, "I don't believe the tire is made that will run me 10,000 miles." Our emphatic reply is, "There is *one* that will do it—and that's the **Brictson.**" With every tire sold, we give a **Specific, Written, Service Guarantee for 10,000 Miles.** Of course, we could not make this exceptional offer had we not put **Brictson** Tires through the various crucial tests that have proven their superiority beyond all question. For the man who doubts, we will do more than that. We will allow you to

Try It First—Before You Pay

The combination of our 10,000 mile guarantee, our puncture proof guarantee and our unprecedented "try it first before you pay" offer, makes our proposition overshadow any project ever before attempted in the tire industry. We offer to let you try **Brictson** Tires on your car **At Our Expense.** Could a manufacturer offer a greater proof of confidence?

Retread Your Present Tires

If you have some new tires at the present time, apply **Brictson Treads** and make them puncture proof, blowout proof, skid proof, rut proof, rim-cut proof, oil proof, gasoline proof—**Trouble** proof. This will convince you of **Brictson** quality and will mean that for the future you will use nothing other than **Brictson** Tires.

Or, you no doubt have in your garage a few old casings where the rubber tread is worn thin. Here is your opportunity to apply **Brictson Treads,** making them proof against all road troubles and get a good long mileage from them.

Don't bother about writing a letter. Just clip the coupon at left, fill it in and mail to us **Today.** It puts you under no obligation.

BRICTSON MFG. COMPANY
Dept. 1118, 1015 to 24 W. O. W. Bldg.
Omaha, Nebraska

FREE TRIAL COUPON

Brictson Mfg. Co., Dept. 1118, 1015 to 24 Woodman of the World Bldg., Omaha, Neb.
Please send to me by return mail, the details of your Free Trial Offer and complete information about Brictson Tires and Brictson Treads.

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Sell The Spring You Would Use On Your Own Car

Put yourself in the customer's place. — That will make more business for you, and eventually, for us.



PRACTICALLY UNBREAKABLE

THERE'S A HARVEY JOBBER NEAR YOU

Our new catalogue giving Complete measurements of over 900 Styles of Springs is yours on request

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HOW ABOUT YOUR EMPLOYEES?

It is a generally accepted fact that employees of any company who have been encouraged to be careful in their expenditures, to save their money and to invest it judiciously do *better* work, have *greater pride* in their jobs, and *greater loyalty* to their employers.

The United States Government now offers employers an unusual opportunity for the systematic organization of their employees for THRIFT through the founding of War Savings Societies.

GROUP SAVING through War Savings Societies bolsters up esprit de corps. It encourages economy in personal and company expenditures. It develops loyalty to company and country.

The organization of a War Savings Society among your employees will be a direct help in winning the war, not only because it helps directly in Government financing, but also it releases men, money and materials for essential war work through the saving on non-essentials.

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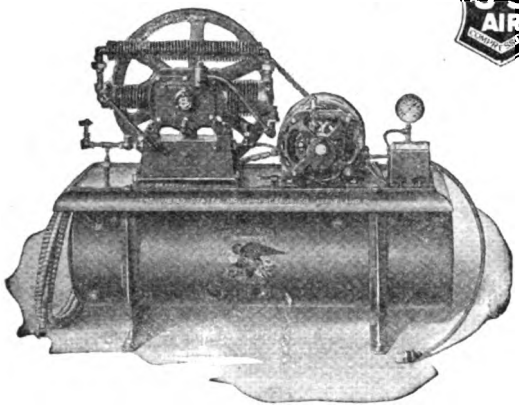
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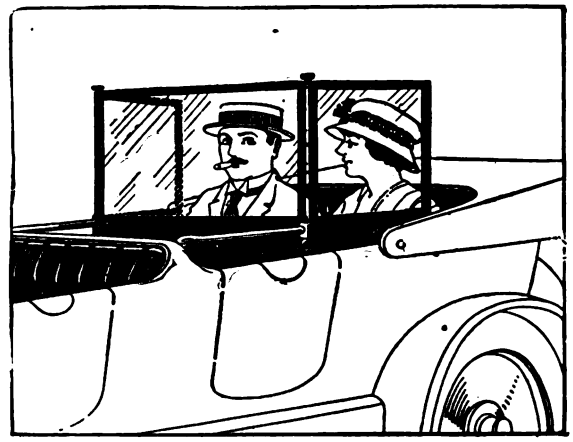
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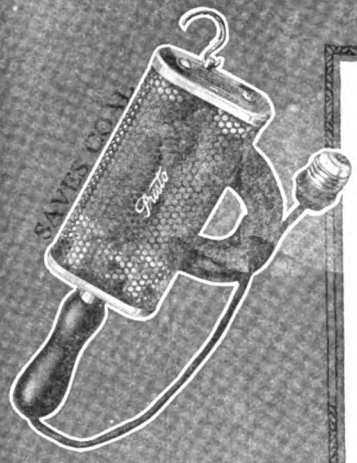


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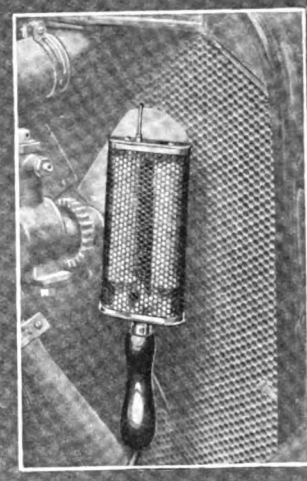
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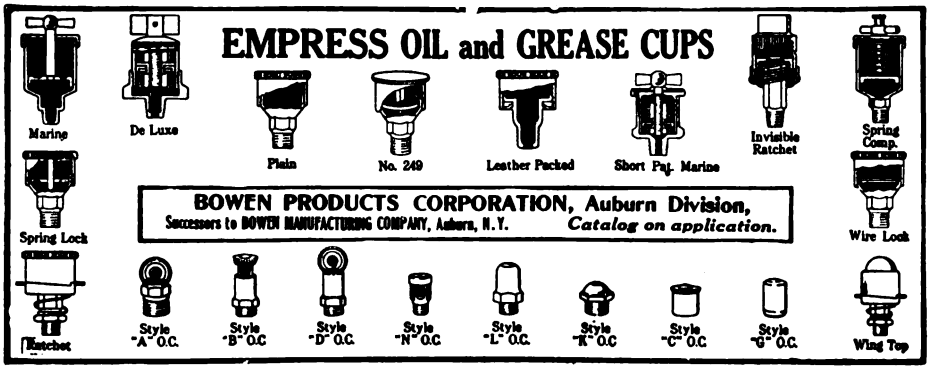
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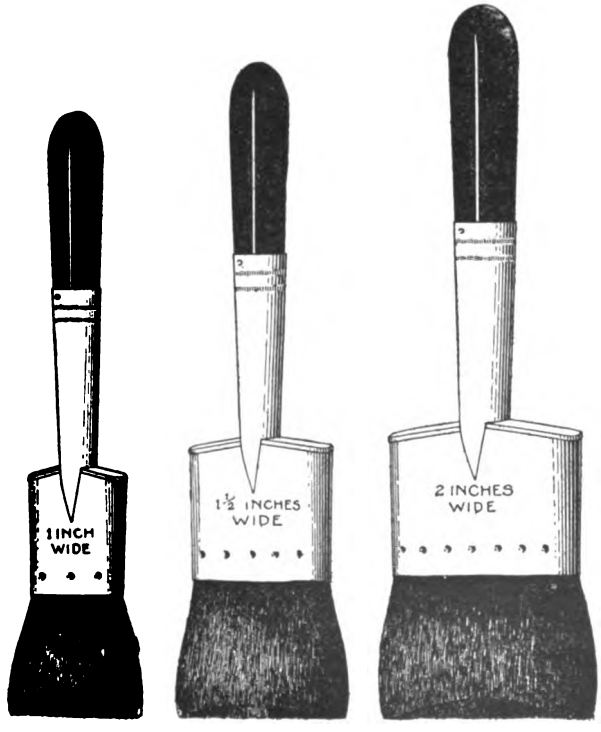
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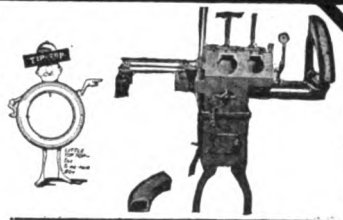
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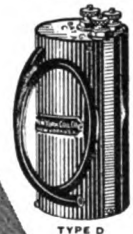
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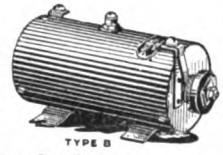


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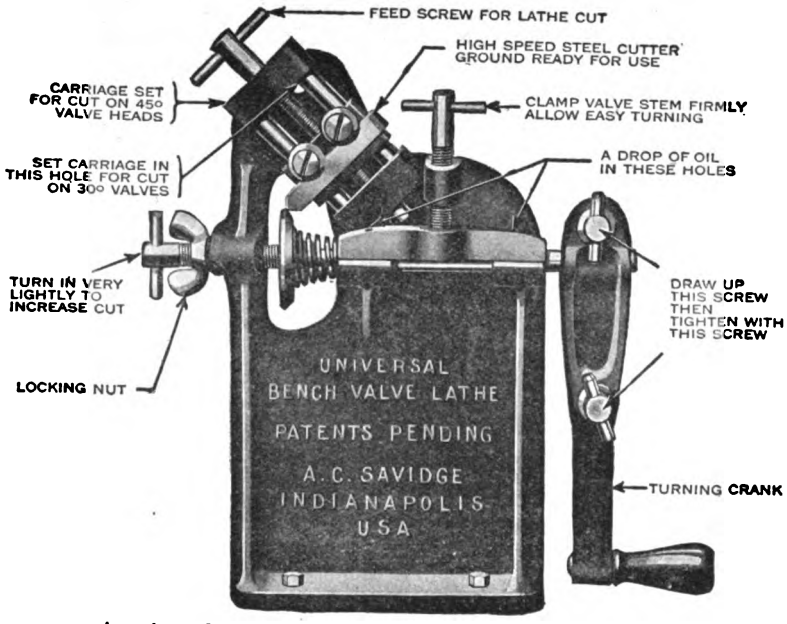




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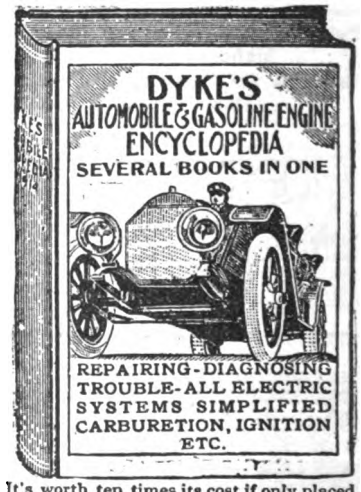
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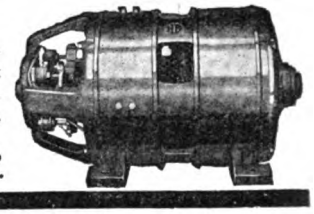
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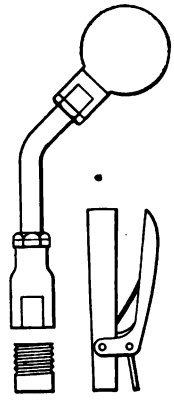
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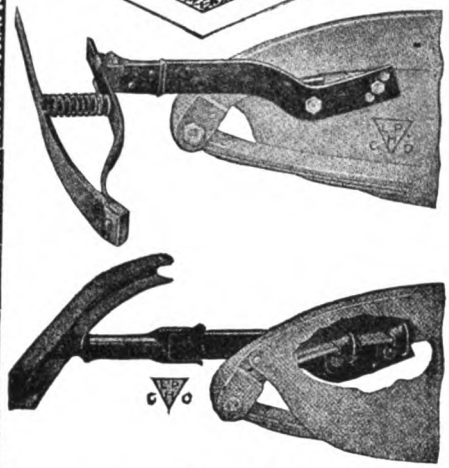


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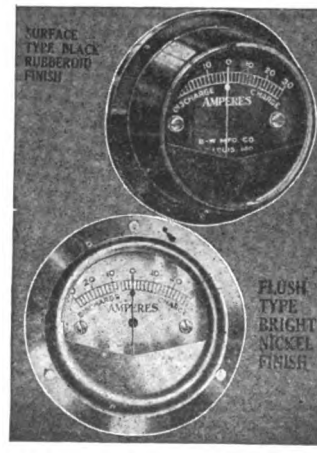
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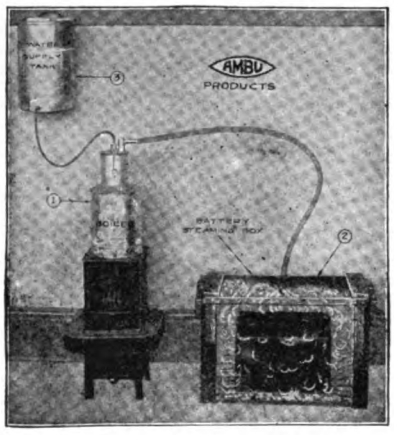
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Softens up the "compound" and enables the men to open the battery in the shortest time with no chance of damaging the box. Many a shop has lost the profits on several jobs by having to replace battery boxes broken in opening. Takes but a few minutes to open any battery. ***Each $25.00***



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Probably one of the most valuable "salvage" devices. By pressing plates properly the life of a battery is doubled and new installations avoided. Made of specially finished wood, acid-resisting. Saves its cost in the time lost in cleaning up the metal vise that has been corroded by acid and water. Produces perfect plates in a short time. ***Each, $32.50***

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Save all the old lead in your shop. Melt it down into usable form in these handy lead moulds. Save their cost in salvaged metal in a few days. Every shop needs a pair and large shops several. ***Each, $1.80. Pair, $3.50***

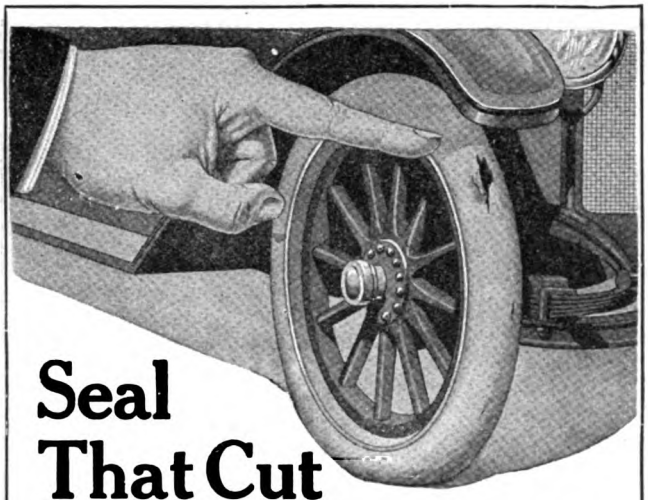
"The Automobile Storage Battery"

A technical book in non-technical language that tells the theory and actual practice in the care and repair of storage batteries. Should be in the office of every shop for reference. ***Postpaid, $5.00***

Every device listed here has been tested and is in use in the leading shops of the country. We guarantee entire satisfaction or your money back without question.

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Ask for our booklet of Battery Shop Helps.

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Makers of A M B U Electric Trouble Shooter



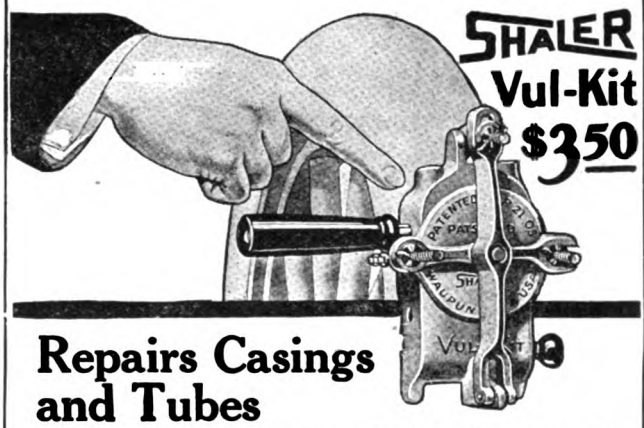
Seal That Cut and Save the Tire!

Casing cuts, punctures, tears, etc., admit moisture, oil, dirt and sand—to the inner fabric of the tire. The moisture soon rots the fabric while the friction of the sand cuts the threads and weakens it. Then you have a big blow-out and expensive repair bills.

The limited supply of tires, and their increasing cost makes it imperative for every motorist to keep the rubber tread—which protects the inner fabric of the tire—water tight—sand tight—oil tight—in order to prolong the life of the tire and get maximum mileage.

You can easily double your mileage—prevent tire trouble—save the cost of new tires and repair bills, by going over your tires once a week with a Shaler Vul-Kit and sealing the cuts, punctures, tears, etc., with new rubber, thoroughly vulcanized. It is easy to do and only requires a little time occasionally when your tires need attention.

The Shaler Vul-Kit repairs all size casings without removing the tire from the wheel or letting out the air. It makes perfect tube repairs—stronger than the tube itself—a perfectly vulcanized repair that can't loosen or cause friction.



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Free Book *"Care and Repair of Tires"*
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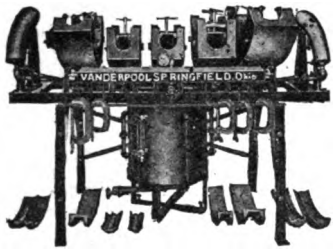
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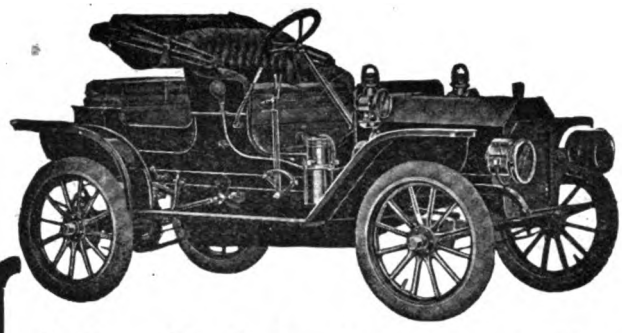
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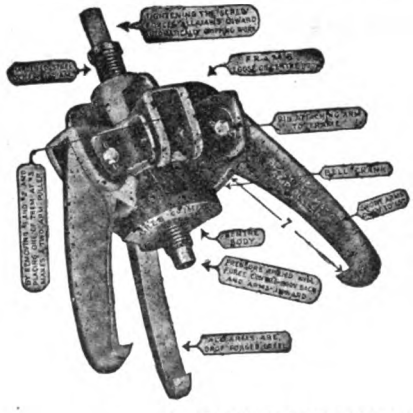
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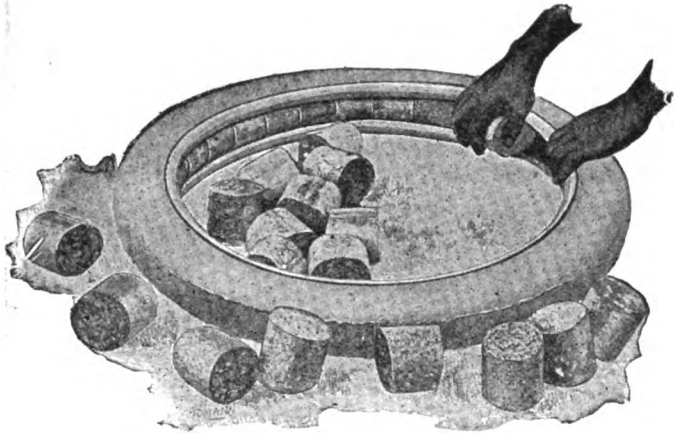
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have made curtailment of rubber imports necessary. Already the excess of demand over supply has caused an increase in tire prices—other increases are imminent.

It's Time Now for Economy

If your heart is in this war, you will clearly see the need of getting the last fraction of a mile out of your tires. You can do so by coupling your patriotism up with

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Motorists Have No Tire Trouble Who Ride on This Perfect Substitute for Air

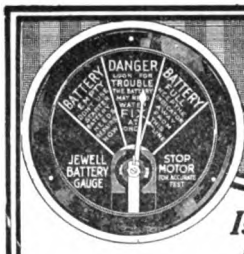
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It stimulates motoring.

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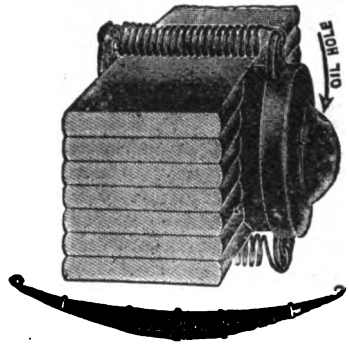


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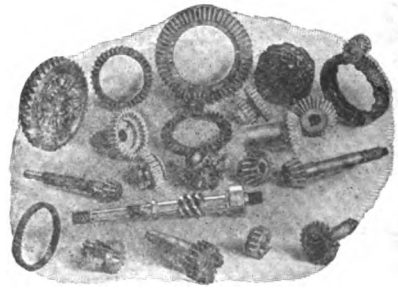
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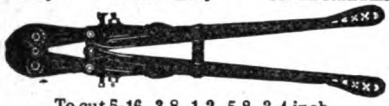
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32x4	4.75	8.00	10.00	3.20
33x4	5.25	8.25	10.25	3.30
34x4	5.50	8.50	10.50	3.40
36x4	5.75	8.75	11.00	3.50
34x4½	5.75	9.00	11.50	4.10
35x4½	5.75	9.25	12.00	4.25
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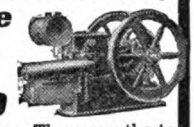


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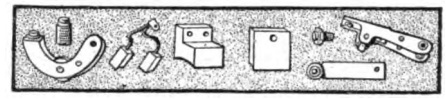


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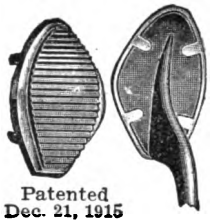
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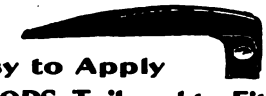
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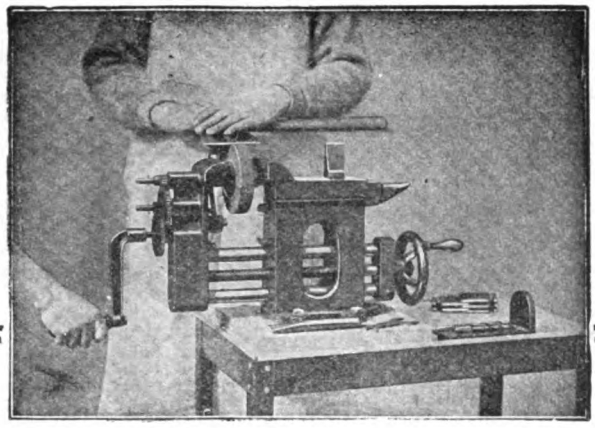
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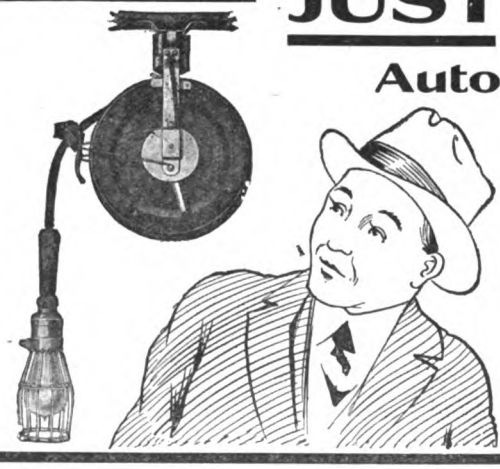
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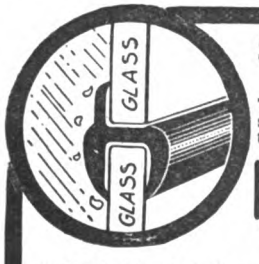


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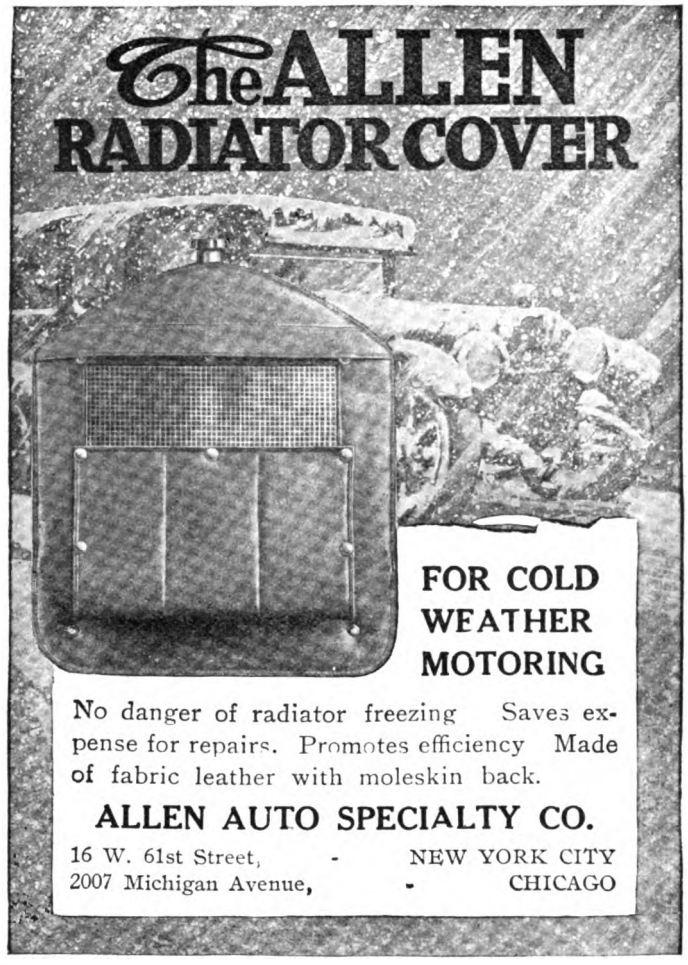
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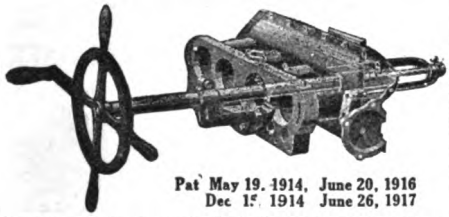
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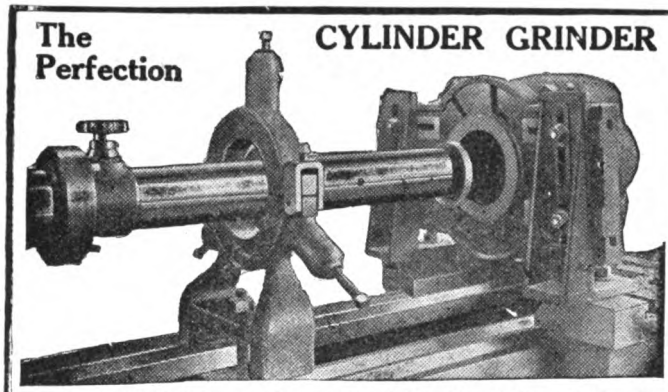
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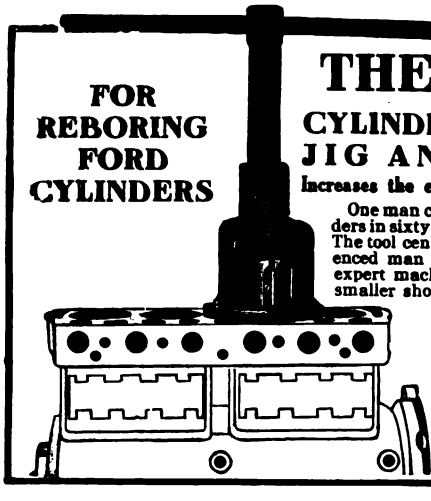
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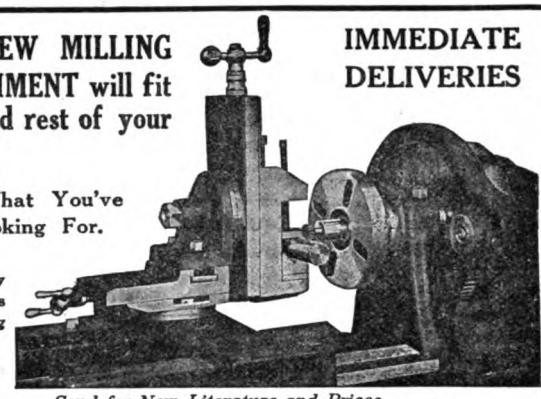
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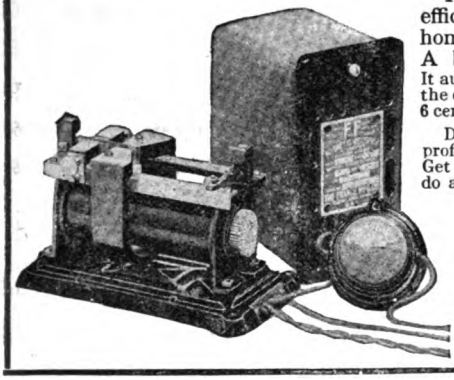
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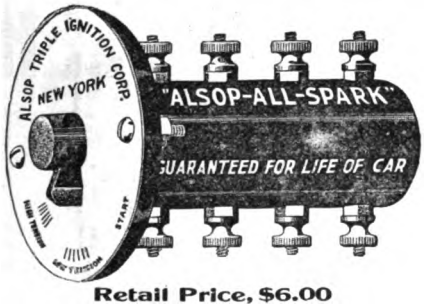
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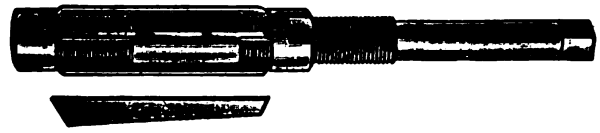
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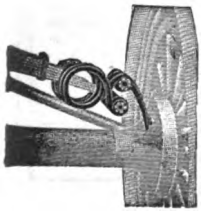
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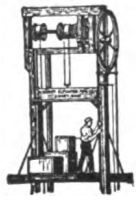


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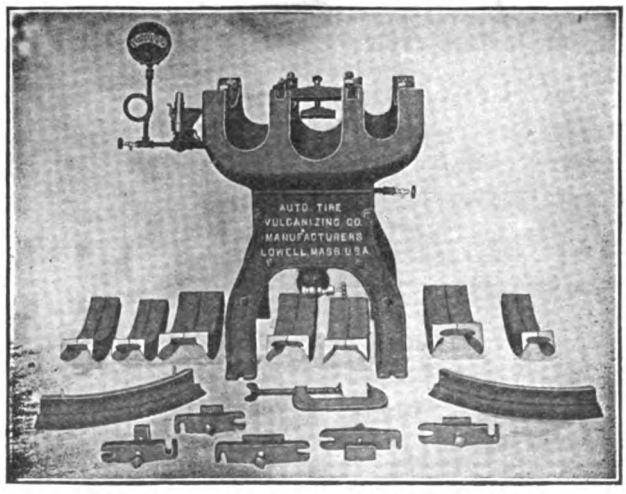
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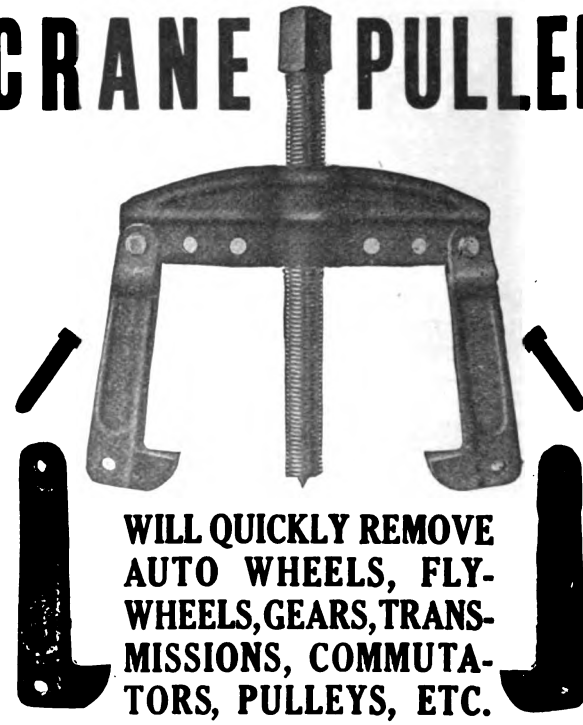
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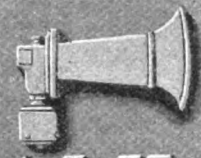
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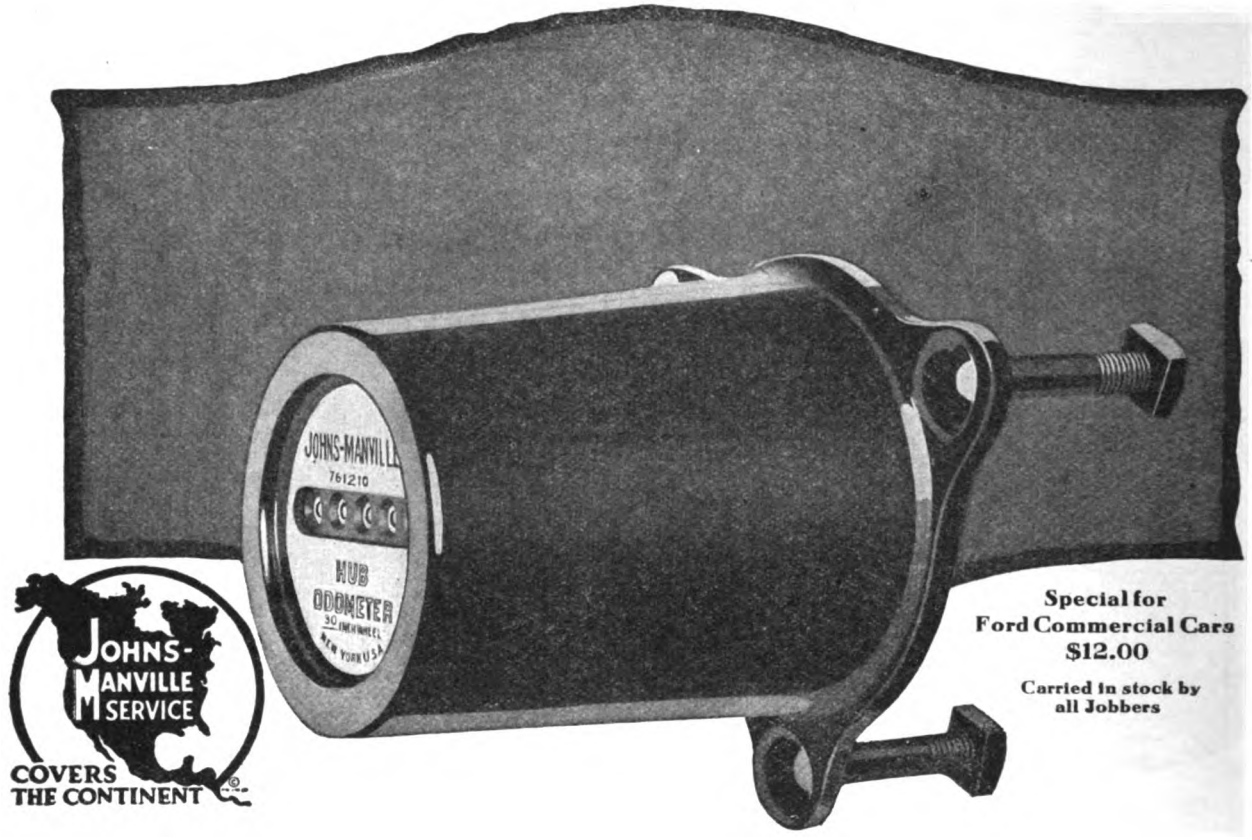
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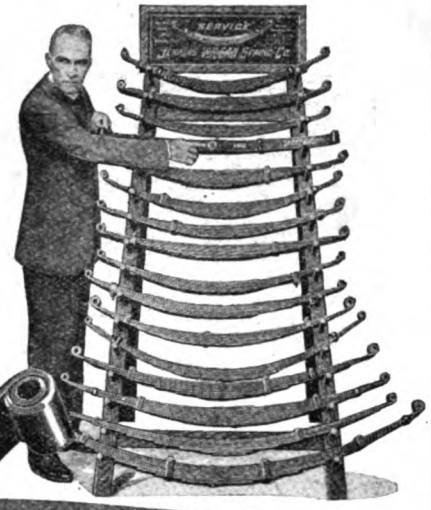
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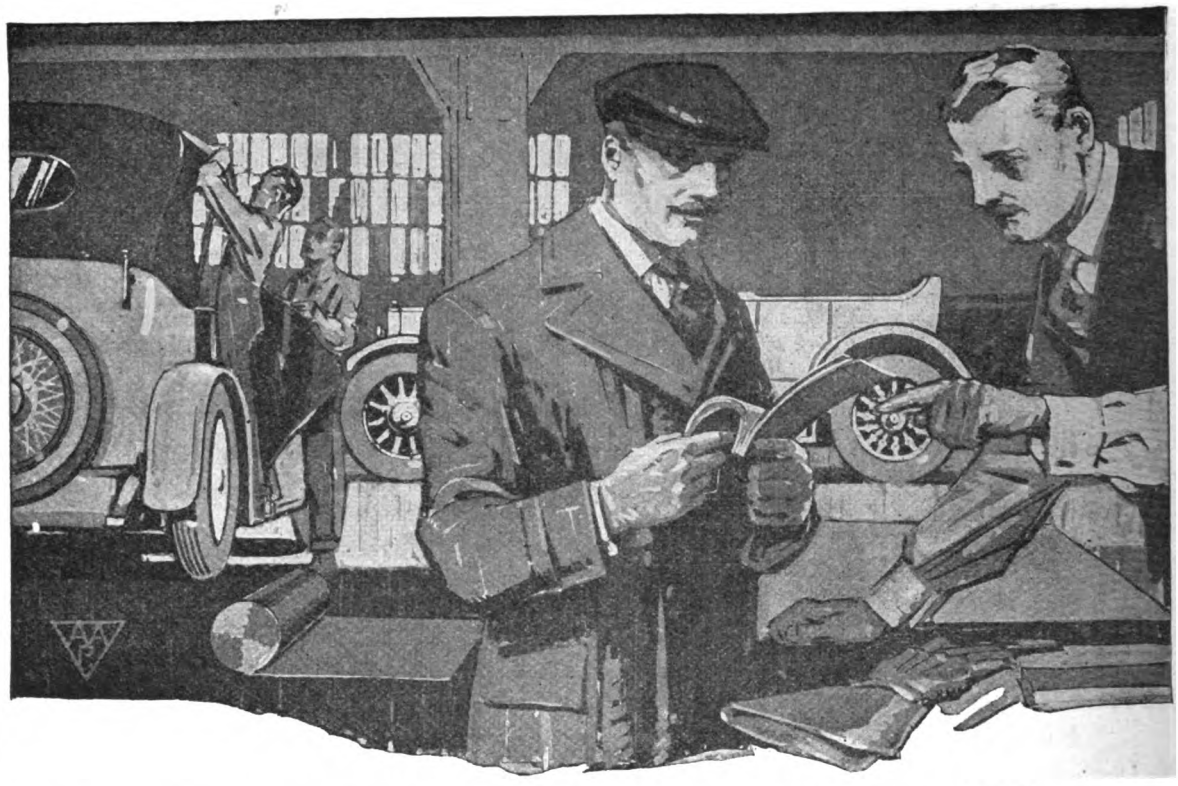
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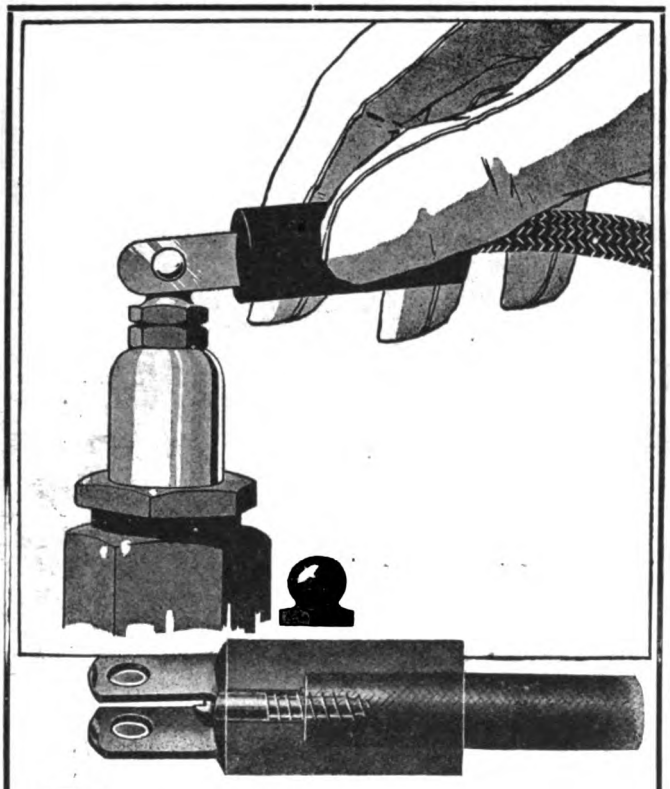
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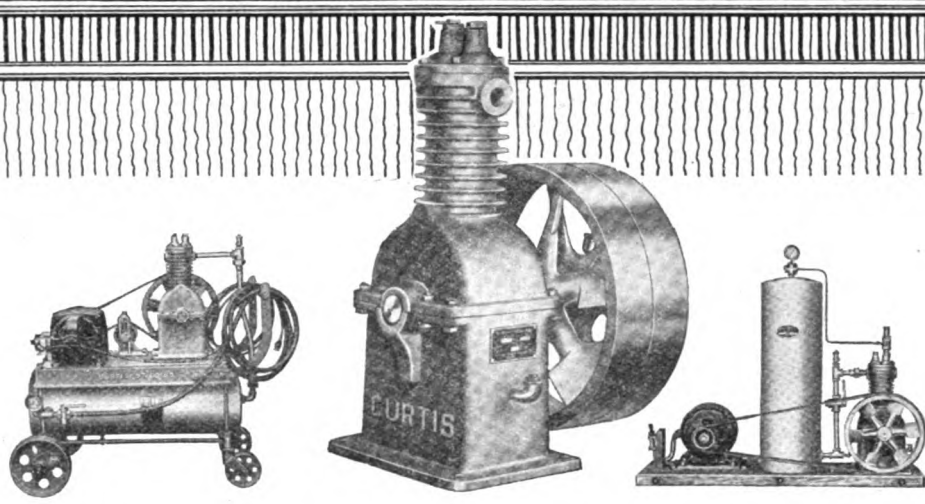
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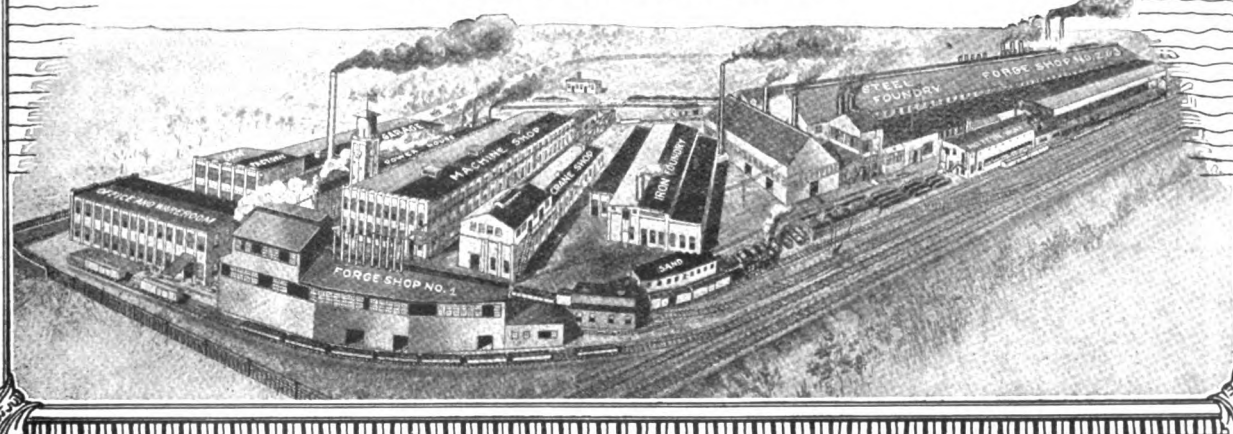
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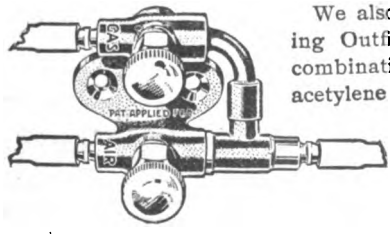
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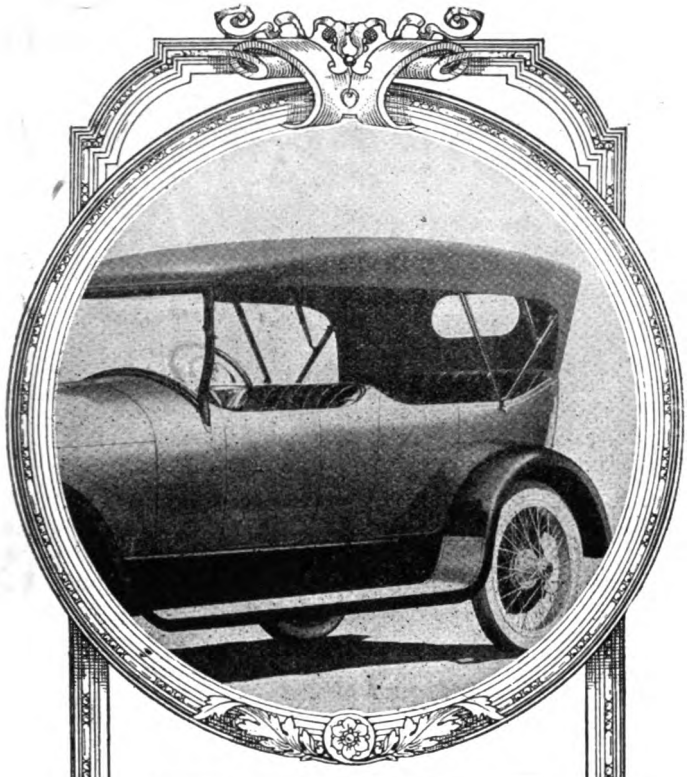
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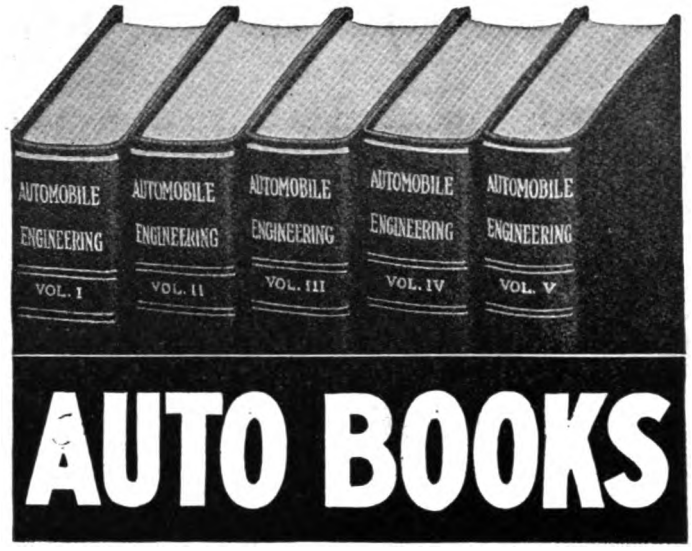
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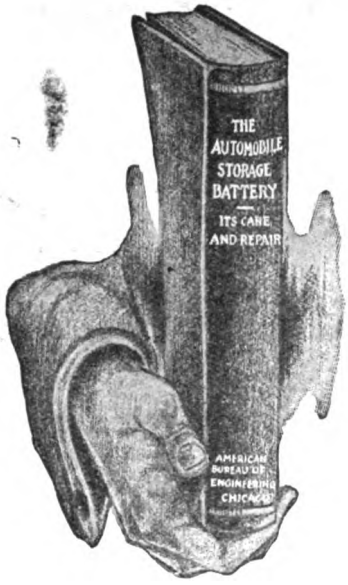
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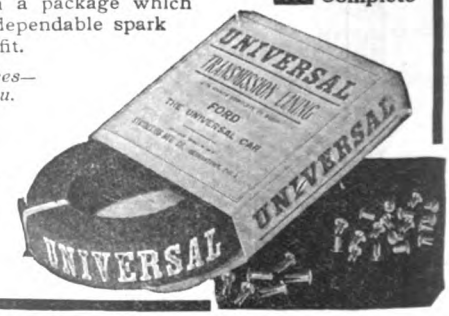
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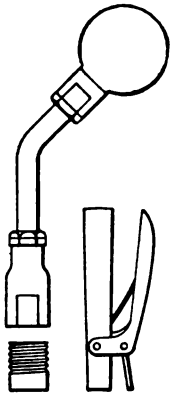
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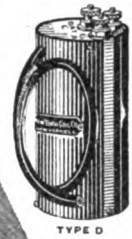
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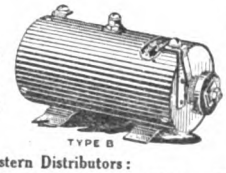


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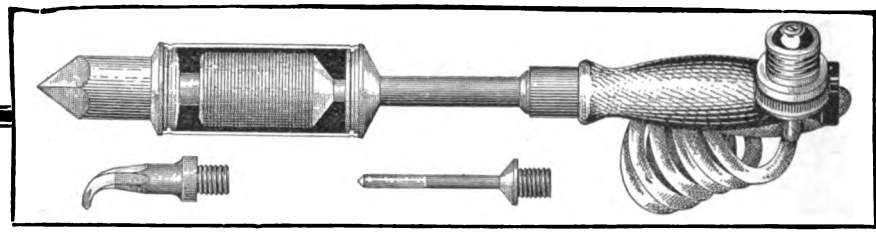




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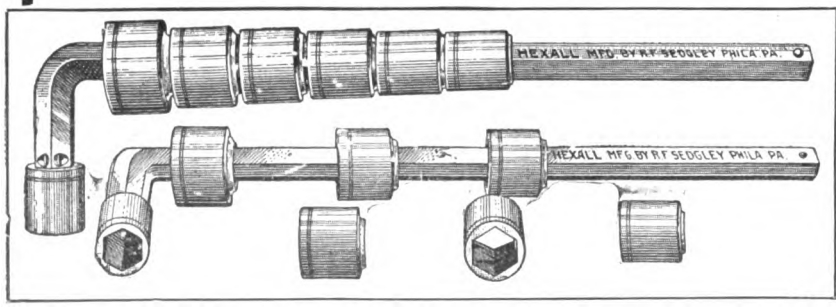
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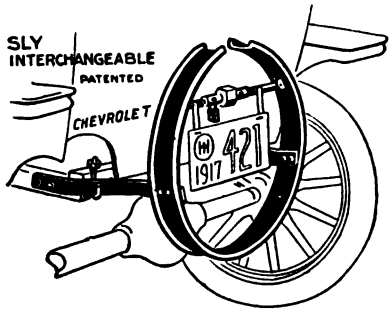
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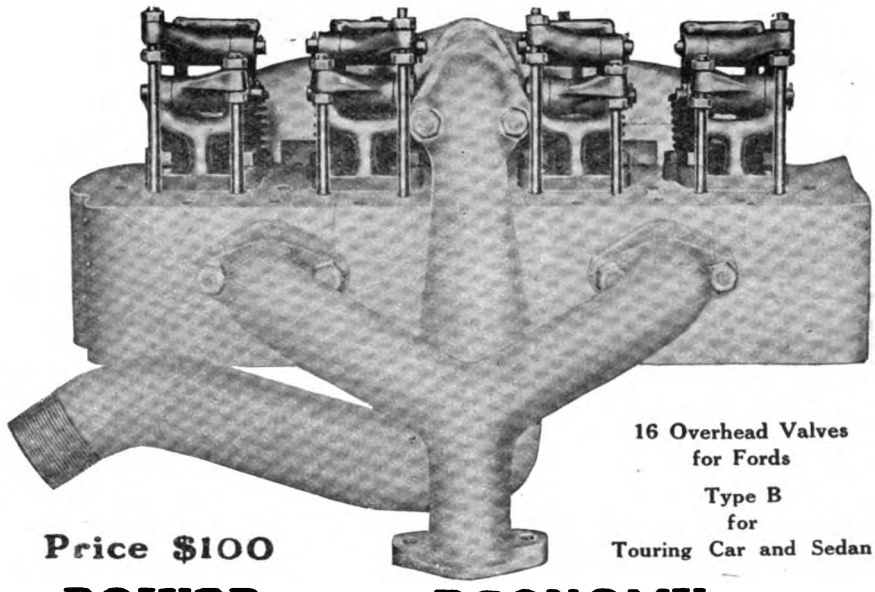
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Produces a pressure-tight union that is gasoline, kerosene, oil and water proof and has a heat resistance five times that of shellac.

If Your Jobber Cannot Supply You, Order Direct

LIST PRICES

2-oz. Swab Bottles, 20c each ¼-pt. Cans, 30c each 1-pt. Cans, 90c each
1-qt. Cans, $1.65 each 1-gal. Cans, $6.00 each

CONSTANT A. BENOIT, JEROME AVE. & E. 18th St., BROOKLYN, N. Y.

20th CENTURY'S No. 6 SELF-VULCANIZING PATCH



This new idea in Patch construction eliminates every possibility of an imperfect tube repair—and the man who looks at an idea to see if he can use it, and not to see if he can get along without it, is the man who wins out every time.

This Patch is Guaranteed Not to Loosen, Leak, Creep or Blow Out. Absolute Satisfaction or Money Refunded

MADE IN 3 SIZES

2¼x16—36 Square Inches, 50 Cents 4x15—60 Square Inches, 75 Cents
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If not found with your JOBBER or DEALER, write to us direct.

20th CENTURY TIRE PROTECTOR CO., MIDLOTHIAN, TEXAS

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As equipment on thousands of trucks, Reflex Plugs helped rush cantonments and later war work. They have qualified for equally important peace service.

REFLEX SPARK PLUGS



Reflex equipped White Truck in early Cantonment War Work.

Reflex construction of Chromite Porcelain and Non-pit Electrodes insure for *you* the same dependability NOW, that made them choice for Standard Equipment on White Trucks in War Work. Your money back if they don't prove better.

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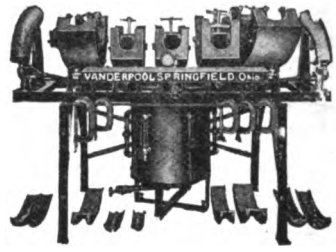
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Don't Let This Be Another "Lost Opportunity"

We urge all wide-awake, up-and-doing ambitious men with a small savings account to go into the **Tire Repairing Business.** Big money. Everywhere a success. No previous training necessary. We instruct you free, teach you everything—how to begin and how to advertise.

The Vanderpool Vulcanizer

5-cavity model has capacity of $100.00 worth of work a day and repairs tires upon the **Correct** principle just as they were made at the factory. Indorsed by leading tire manufacturers. This field uncrowded. Investment small and immediate returns. Write for full particulars, testimonials and FREE

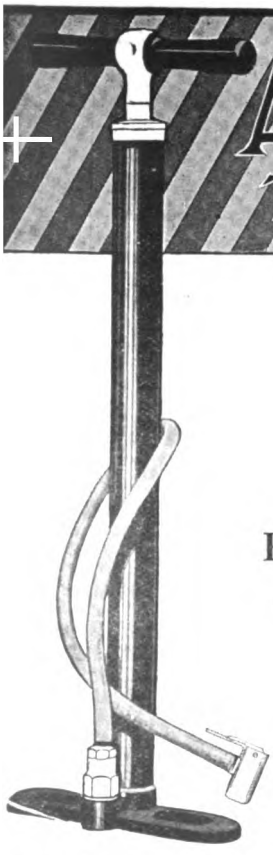


Tire Repairing Manual

In Answering, Address Dept. E-4

The Wm. Vanderpool Co., Springfield, Ohio

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SIMPLE
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REMARKABLE
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EXAMINE IT
AND YOU WILL
BUY IT

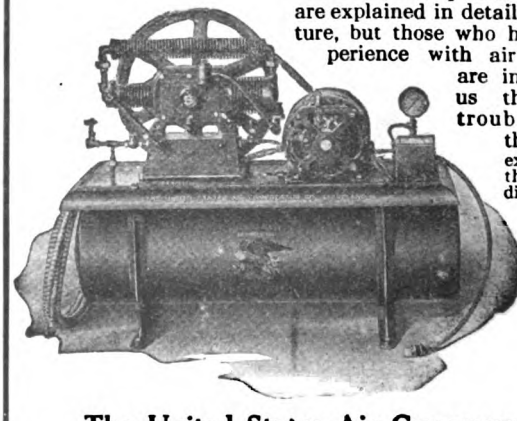
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The United States line comprises 90 different numbers in Two-Stage and Single-Stage Types, and various individual equipment adapted for forming combinations of almost unlimited kinds and capacities.

This is the U. S. De Luxe Compressor

Perfect in Design, Material, Workmanship and Finish

THIS machine embodies every feature recognized as good air compressor design, plus several improvements distinctly its own. This combination has gained for it recognition as the most practical compressor available and placed it in a majority of the better garages, tire shops and gas stations.



The 14 definite points of superiority are explained in detail in our literature, but those who have had experience with air compressors are invited to tell us their specific troubles in order that we may explain just how that particular difficulty has been eliminated in the De Luxe design.

Interesting Literature Mailed Upon Request

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Crane Puller

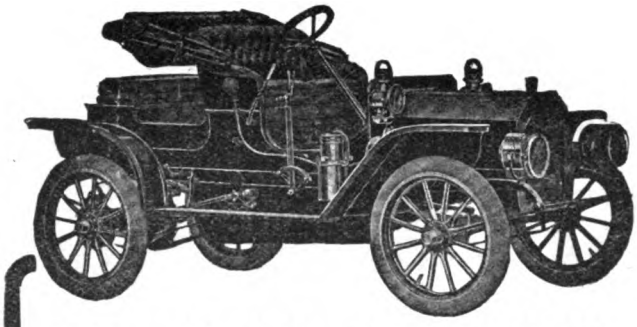
With Arbor Press Base

This attachment bolts to your bench, your Puller is fastened to it with two set screws, making a powerful and practical arbor press.



Patent Pending

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The **Auto Repairers' Guide & Price Maker** is issued in the interest of automobile repairers, dealers and garage men—**it's free to the trade** and sent to them only.

Think of it, **512 pages of bargains**—about 3000 illustrations—a complete auto repairers' guide and price maker—quotes **lowest wholesale prices on** first quality automobile supplies, auto repairers' tools, tool kits, spark plugs, horns, lamps, pumps, springs, forgings, brass fittings, batteries, coils, switches, auto tops, Ford Specialties, and in fact **everything used on an auto.**

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FOR THE WOODRUFF SYSTEM

For the benefit of dealers, garages, and repair men, we are prepared to furnish our keys put up in two assortments. Every garage and repair man should keep these on hand. They may be purchased from the leading jobbers or ordered direct from the factory.



Regular Assortment

One hundred keys of the sizes most likely to be required for repair work.

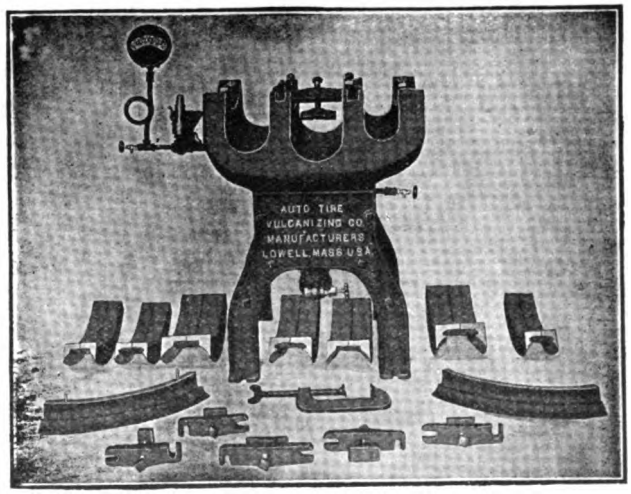
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Exceptionally Large Profits can be made by Repair and Garage Men with

No. 8 Lowell Adjustable Sectional Vulcanizer

It's different, superior, economical in operation, in fact beyond comparison.

Complete and thorough work can be accomplished with this vulcanizer at all times.

DON'T LOSE A MINUTE—WRITE TODAY!

Auto-Tire Vulcanizing Company,
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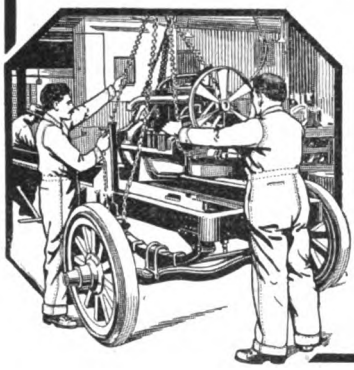


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You men and women on the "firing lines" of industry should wear garments of this patriotic economy cloth, too.
It's fast color and *wears like leather.*

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made of the genuine IRONCLAD KHAKI (the kind Uncle Sam uses) carry the yellow "Army label" like the above. LOOK for it and the Guarantee Bond in the garments before you buy.



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Specialty. Saves the batteries of the self-starter; saves the back of the man who cranks-his-own.

No Matter if the temperature is 20° below zero, a few drops of **"Flash"** introduced through the pet cocks will start the engine instantly. And it'll start trade your way just as surely.

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Guaranteed for 10,000 Miles



EVERY Brictson Tire is sold under a specific 10,000 mile written service guarantee. This guarantee is the longest and strongest ever put behind a pneumatic tire and is a positive protection to every purchaser.

"Absolutely Puncture Proof"

Brictson Tires are puncture proof, and proof against blowouts, skidding, rut wear, rim cuts, and can't be damaged by oil or gasoline. Wonderful resiliency, easy riding qualities as well as economy commend them to car owners,

The Big One-fourth Retread Feature

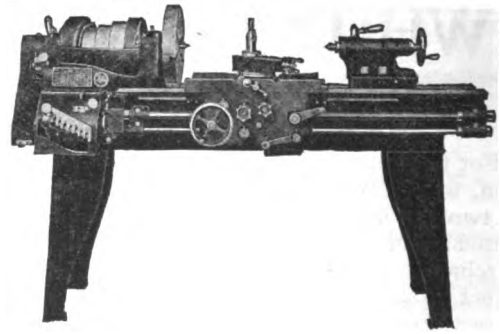
Should the tread surface wear out after 10,000 miles of service you can get a new retread for one-fourth the original cost of the tire, instead of buying a new tire, and you keep the remaining three-fourths in your pocket. With ordinary service the Brictson Tire should run enough beyond the 10,000 miles to require one or two extra retreads. The more retreads you use the cheaper your service.

FREE TRIAL OFFER

To convince you the Brictson Tire will give satisfaction TRY THEM ON YOUR CAR AT OUR EXPENSE. Write today for this Free Trial Offer, a copy of our guarantee and full information about Brictson Tires.

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Brictson Pneumatic Tires



14"x6' Monarch Lathe

Other Sizes, 16, 18, 20-Inch

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Monarch Lathes are low in price and within the reach of every garage owner. They are used in every class of work from the finest toolroom work to production work in the largest factories.

Furnished with taper attachment, milling, keyway cutting and gear cutting attachments, and other attachments useful in the Auto Repair Shop.

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THE Fisher PATENTED "RIM-GRIP" SUB-CASING

MORE MILES PER TIRE

LESS TIRES TO BUY

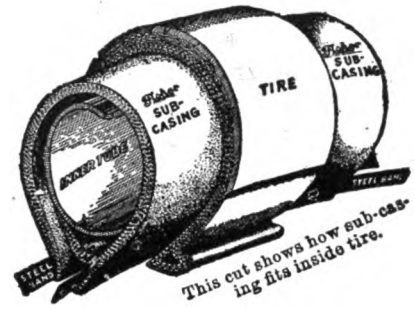
The Blows That Your Tires Receive, When You Strike Objects in the Road, Leave Weakened Places in the Fabric

A TIRE IS AS STRONG AS ITS WEAKEST POINT

The weakened places are hard to detect now, but will result in blow-outs later.

RIM-GRIP SUB-CASINGS reinforce the fabric of the tire at all points from bead to bead. They make a partially worn tire stronger than it ever was. It can be worn out completely and the sub-casing used in another tire. As the cost of equipping a car with new tires is much greater than last year, it will pay you to investigate Rim-Grip Sub-Casings.

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This cut shows how sub-casing fits inside tire.

FISHER MANUFACTURING CO.

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HOSE CLAMPS

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Scientifically constructed of steel. Nickel plated or (Parkerized Rust Proof). Stock sizes from 5/8" to 3½" by 1/8" variations.



Dimensions given are outside diameter of hose. Send for Samples, Price List and Discounts.

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NON-SKID CHAINS FOR SOLID TIRE VEHICLES



Simplicity
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Easy to Attach and Detach

A Size to Fit Every Spoke – Round or Square



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like their products, need no introduction to the experienced steam or gas fitter.

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"Makers of Genuine ARMSTRONG Stocks and Dies."



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Auto Smash! 3 Killed, 2 Fatally Injured. Due to Mistaken Signals.

This happens every day.

When will your turn come?

Prevent the accident by providing your car NOW with the

SMITH AUTO SIGNAL

It eliminates hand-signaling and tells definitely, positively and unmistakably what you are going to do. The burden of proof is then on the "other fellow." Don't wait until afterwards.

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KEROSENE!

THE BEST FUEL FOR FORDS

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YOUR FORD

will give much more satisfaction on clear kerosene than on gasoline, at 60 to 70% less cost, and have a smoother, steadier-running engine, if equipped with an

OLSEN KEROSENE VAPORIZER

Quickly installed on regular carburetor without engine changes. Only tools needed a wrench and screwdriver. Perfect combustion—no smoke, smell, skipping, stalling, or loading-up. Greater flexibility. About 20% more mileage.

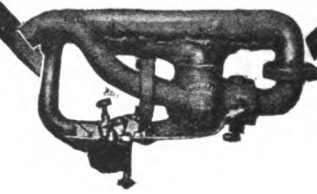
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Don't let it get scratched or shabby.

"F-S" "Evernew" Auto-Body Enamel

gives a bright, attractive finish that is hard and durable. Easily applied and doesn't show brush marks. Eight standard shades—special shades to order.

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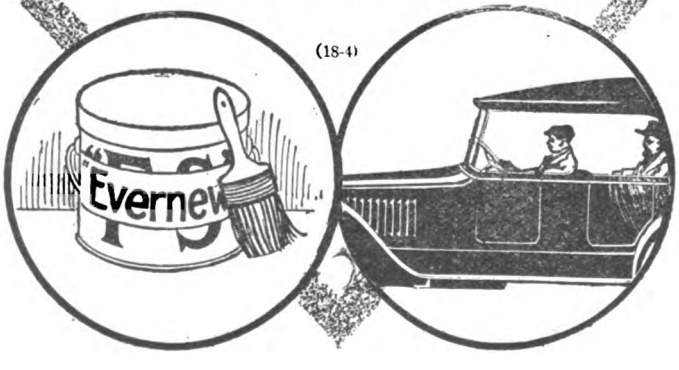
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Thoroughly Modernized
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Rates—Without Bath, $1.50
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Do you know what WHITING-ADAMS means? It means satisfaction in brushes, good work, long wear, best results. Send for Illustrated Literature.

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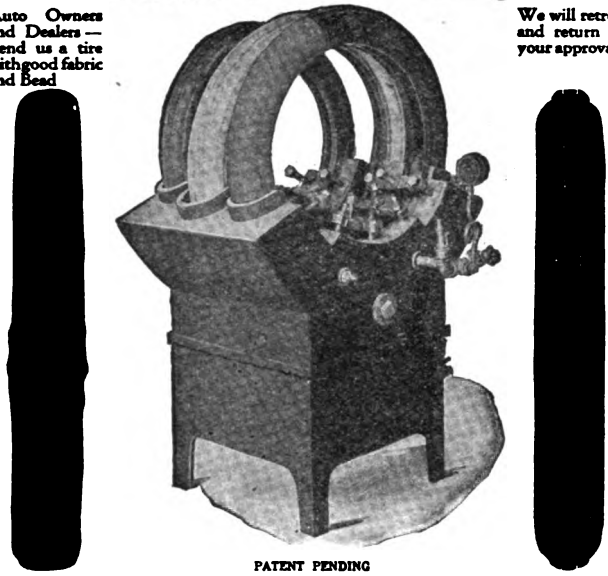


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Zwebell Retreader and Tire Rebuilding Machine

Auto Owners and Dealers—Send us a tire with good fabric and Bead

We will retread and return for your approval.



PATENT PENDING

Never in the history of the tire business has the demand for rebuilt tires been so great as it is in this day of eliminating waste. You don't have to create the field—the field for your action is already created—it is a tremendous one and only waiting for more men. There will be no long drawn-out delay—you can go at it right now. We will post you on every point in rebuilding tires in sections and complete. This outfit pays for itself in so short a time, that it's surprising that anyone should hold back at all. It is a permanent business that will grow along with you as long as you live and then some. The Zwebell Retreader Has the Widest Range of Usefulness of Any Tire Machine on This Earth—It Has No Equal. Big designing engineers say so, and you want the best or none at all. Did you ever see a tire repairman who didn't have *more* than he could attend to? What are *you* doing—looking at the other fellows getting all the money and you just folding your hands? We will put you in "the swim" quick but you must write us a letter today—and don't fail to do it. We will explain everything—nothing will be left untold. This is the logical business for the Automobile Dealer, Garageman, Filling Station, to go into during this time—Conserve. Send for sample section of work done on this machine.

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At Our Risk-You Can Prove it.

DON'T waste good money on tire pumps that either break your back, or pump *Rubber Rotting* oil particles or gasoline fumes into your tires.

TAKE NO CHANCES

At our risk you can prove that the "DEAD EASY" is quicker, safer, easier and cheaper than any other tire pump, either engine drive or hand power. Convenient to carry with any car, it is always ready for instant service. The gauge showing exact tire pressure, there is no guess-work—and it's "DEAD EASY."



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Write Today, NOW, for Fifteen-Day — No-Money-in-Advance—Free Trial Offer.

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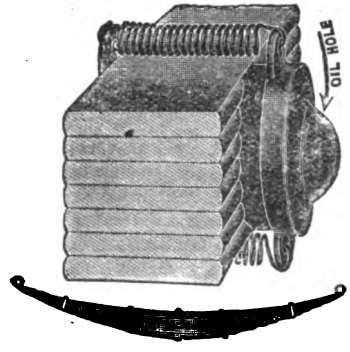


That can be relied upon to be accurately machined, and of the highest grade material, to fit all makes cars,

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Are Essential to Easy Riding Springs. RUSTY AND UNYIELDING SPRINGS DO NOT TAKE UP SHOCK.

Automatic lubrication of springs means easier riding and less wear and tear on springs, rods, shackles and tires. Less squeak and less rattle

Enjoyment and Life of Every Car Increased.

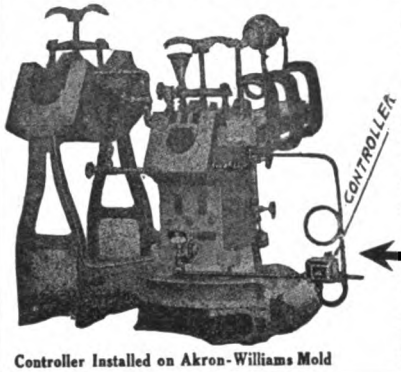
Price 30 Cents Each
Ford Set $1.20
Same Size Fits All Cars
Easily Attached Self-Adjusting Inconspicuous

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AUTOMATIC CONTROL OF STEAM PRESSURE



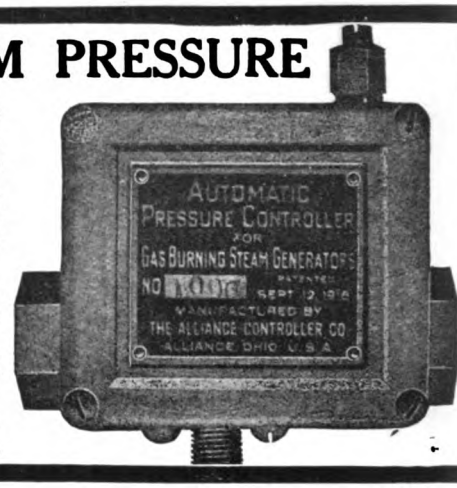
Controller Installed on Akron-Williams Mold

FOR ALL GAS-BURNING VULCANIZING MACHINES

THE ALLIANCE CONTROLLER

automatically regulates the gas consumption and holds steam pressure at the desired point. It allows a full flow of gas to the burner to bring the steam up to the desired point quickly, and then automatically regulates the gas to the exact quantity needed to hold that pressure.

The Controller is easily adjusted and needs no further attention. Simply light your burner and forget it. Your steam will always stay at the pressure you want to carry.



Complete Instructions with Each Controller. $7.50 Each

Send Money Order Now and Begin to Save

THE ALLIANCE CONTROLLER CO.

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JUST WHAT I WANT

Automatic Extension Reel

For Electric Lamps



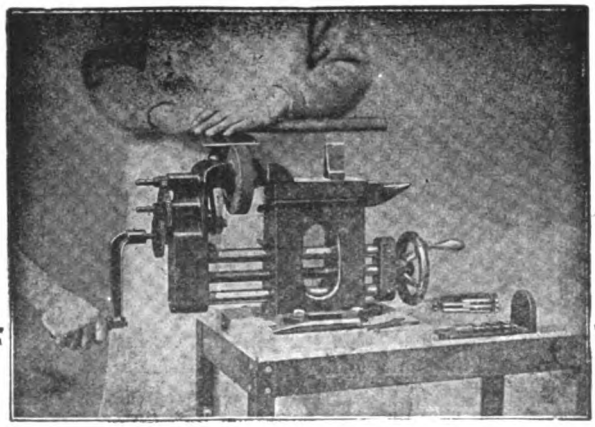
Take your lamp with you to any part of your machine shop or garage—an automatic lock holds the lamp at any desired distance from the reel. It can't get out of order because it's professionally manufactured.

Tisn't a half-baked proposition nor an amateur outfit—but a splendidly strong Extension Reel for men who haven't got time to bother with any nonsensical makeshift. Equipped with 25 feet of reinforced cord. It's all good quality—don't cost much either. Approved by the Underwriters.

Write for Particulars

The Cincinnati Specialty Mfg Co., Inc.

Sylvan Ave. and Powers Street - CINCINNATI, OHIO



Here's a Gift He'd Use and Enjoy as Long as He Lives

For the man who loves to tinker with his car, there's a lifetime of satisfaction in the Stewart Handy Worker. It is a complete repair outfit.

The man in the picture is using it for grinding. It includes strong, practical anvil; powerful vise up to 4¼ inches; a sure-grip steel pipe vise; corundum grinding wheel, 5 inches by 1 inch; a two-speed drill press, with 2 drills; a metal cutting wedge and driving mechanism of three speeds—direct, 4 to 1 and 16 to 1—easily regulated by changing handle grip. It operates grinding wheel, buffing wheel and many other similar tools. All for $16.

Send $2 with Order

Pay balance on arrival. Get money back, if not satisfied. Descriptive booklet gladly mailed on request.

CHICAGO FLEXIBLE SHAFT CO.

Dept. M, 12th St. & Central Ave., Chicago

6 Tools in One

For Only

$16.00

Every *private* garage should have one.

Every *public* garage should have at leastone.

Stewart Handy Worker

Leave Your Tube in the Vulcanizer

AND WAIT ON YOUR CUSTOMERS

Why Not?

AMERICAN AKRON

Famous Five-Minute Cure Cement

WILL CURE IN FIVE MINUTES

Will Not Overcure, If Left in the Heat for One Hour

Put Up in Seven Size Containers
Made in Two Grades—Red and Gray
Recommended for Both Casing and Tube Repairs

IF YOUR VULCANIZER IS YOUR BOSS, DECLARE YOUR INDEPENDENCE TODAY

Write for Prices

The American Rubber & Tire Co.

AKRON, - - - - OHIO

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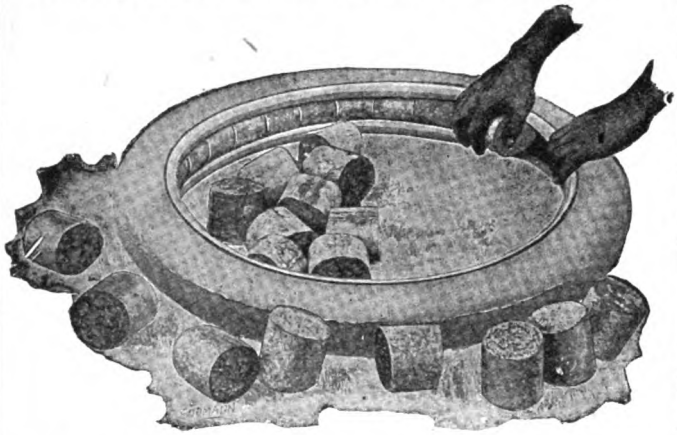
National Needs

have made curtailment of rubber imports necessary. Already the excess of demand over supply has caused an increase in tire prices—other increases are imminent.

It's Time Now for Economy

If your heart is in this war, you will clearly see the need of getting the last fraction of a mile out of your tires. You can do so by coupling your patriotism up with

National Tire Filler



Motorists Have No Tire Trouble Who Ride on This Perfect Substitute for Air

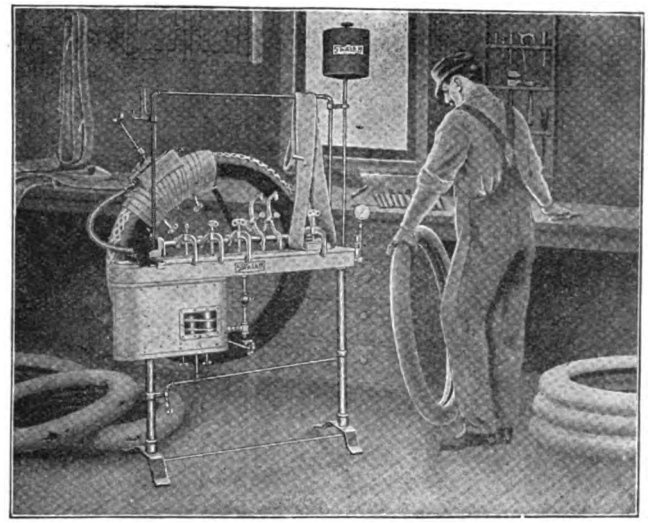
Rim-cut-proof, blowout-proof, puncture-proof tires are now a reality. Motoring is now freed from the shackles of tire trouble, and is made safe, comfortable and enjoyable.

National Rubber Tire Filler replaces the inner tube. It has all the resiliency of an air-filled tire with none of its disadvantages. It lasts indefinitely—40,000 miles or more. It has been in use for five years and has conclusively proven its superiority and economy over air-filled tires. Our factory taxed to capacity is proof positive of its great popularity.

It rides as easy as air.
It cannot puncture or blowout.
It can be used in all style tires.
It can be installed on all makes of rims.
It doubles tire mileage.
It is easily installed.
It stimulates motoring.

National Rubber Filler Co.

208 College Street **Midlothian, Texas**



Make Money Now Repairing Tires

The increasing cost, and limited supply of tires makes it necessary for motorists to conserve their casings and tubes—to get the maximum mileage. Present conditions offer tire repair men a big opportunity to make money—and help win the war. Experienced help is not necessary. A boy can learn how to make perfect tire repairs in 30 minutes. Every car owner in your town is a possible customer. Jobs are plentiful, because tires blow out and puncture every day. Motorists are willing to pay liberal prices for repairing punctures, blow-outs, cuts, tears, rim cracks, etc.

SHALER SHOP VULCANIZER

Is the Only One That Has

Automatic Heat Control

Will do as much and as perfect work as the large, expensive vulcanizing outfits which cost from $250 to $500. The price of this Complete Steam Vulcanizing Plant—heated with either gas or gasoline—is remarkably low—$70 subject to Trade Discounts. Outfit shown above is Type N. P. R.—No. 41—other models heated by steam or electricity are described in our catalog.

It is portable—easily moved to any part of the shop—occupies, but little floor space—a boy can operate it easily, and make perfect repairs. The Shaler Patented System of Automatic Heat Control regulates it automatically. It must vulcanize just right. Can't overcure or undercure, and requires no watching or regulating. Large capacity. Repairs 12 casings and 200 tubes a day. Handles any style or size of tube or casing.

The Shaler Wrapped Tread Method of tire repairing is used by all tire manufacturers. It mends casings and tubes quicker, better and at less cost. We furnish Complete Instructions with each outfit. So simple that anyone can do perfect work.

Ask Your Jobber—or Write for Catalog

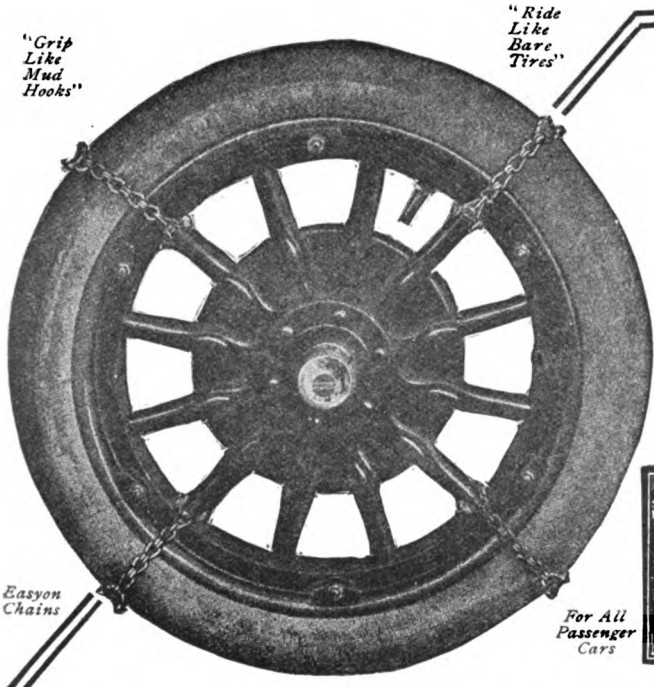
of the Complete Line of Shaler Vulcanizers for Repair Shops, Garages and Motorists' use.

C. A. Shaler Company

811 Fourth Street **Waupun, Wis., U. S. A.**

Oldest and Largest Manufacturers of Vulcanizers

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Sell accessories trademarked

WOODWORTH Worth While

TRADE MARK Registered

EASYON TRUCK CHAINS

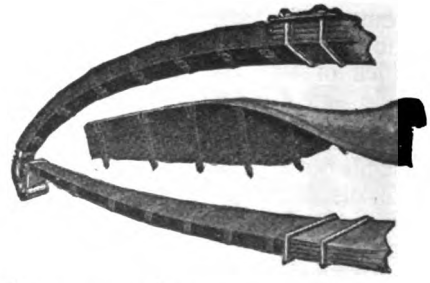
EASYON Truck Chains go on in a flash—plump, snap, snap!—that's all—simplicity itself. No jacking—no moving of car—no annoyance. Packed, set of 8 to the bag—four for each rear wheel. Only three sizes to stock.



EASYON Truck Chains are single chains for solid tires—fastened to the spoke in a trice—unlocked as quickly. Substantial — give extra long service—tread chain renewable—no marring. Give measurement around tire and rim.

Spring Cover and Lubricator

Protects from rust—dirt—moisture—spring breakage. Lubricates springs for entire season—even to inaccessible parts. Gives 100% riding comfort. Only seven stock sizes to fit any make of car—elliptic, cantilever, or any type of springs—low prices a strong selling point.



Other Woodworth Worth-While Accessories

Steel Studded Treads – Steel studded leather covers for re-treading old or protecting new automobile tires on bad roads.

No-Stretch, No-Slip Fan Belts—Of strong inelastic webbing—facing of specially prepared leather on contact side. Long wearing—always hug pulleys perfectly.

Overshoes — Steel studded leather covers especially treated to be waterproof—non-stretching — non-cracking.

Woodworth Trouble-proof Tires
Woodworth Inner Tubes
Tire Boots
One-Ply Hook-On Boots
Strap Boots
Lace Boots
Inner Sleeves
Rimco Frictionless Mica Powder
Woodworth Clear-Light Lens

Write for catalog, prices, dealer's terms and selling helps.

Woodworth Manufacturing Corporation, 2000 Whirlpool Street, Niagara Falls, New York

For Canada, Niagara Falls, Ont.

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Automobile Dealer and Repairer

A Journal of Practical Motoring

Registered in the U. S. Patent Office

VOL. XXVI. No. 4. NEW YORK, DECEMBER, 1918. PRICE {10c. PER COPY / $1.00 PER YEAR

Helping Your Car To Hibernate



He tucked away his little Ford, upon a winter day; then he forgot his new machine and calmly walked away.
The cold winds blew, the water froze, the snow it heaped around; but still that Ford stood shivering upon the cold, cold ground.

* * *

When winter's blast had ended quite, and robins 'gan to sing; his thoughts turned toward the broad highway, like birds upon the wing.
Back to the shed that owner went, his little Ford was there; its paint was cracked, its top was creased, and tires devoid of air.
Forth from its damaged cooling parts, the water slowly dripped. He started up the engine new; the water jacket ripped.
And while he cussed, the engine groaned, a wreck 'twas plain to see; his pocketbook gave one mad leap (you can't get things done free).

* * *

"Ah me! Oh my!" he vainly cried, "Had I but used my head, in putting up my auto'beel, it would not now be dead.
"Had I but drawn the water off, and jacked it from its wheels; I would not face an expert's bill, or go without my meals.
"Out through the country would I speed, a man from care set free; but now I own a mess of junk, that couldn't chase a flea."

* * *

The moral of this short, sad tale, to you is surely plain:—wax will not stand the Summer's sun, nor flowers the Winter rain.
If you would keep your car intact, from Winter's zero weather; take our advice herein contained—observe it to the letter.



I WONDER how many of the readers of this magazine have ever watched a caterpillar go to bed for the winter, and I also wonder how many have tried to get the caterpillar out again before it was time for the butterfly to emerge from the cocoon? One thing is certain, if you have seen or tried either of these things, you will realize that Mother Nature is the most careful person on earth when she puts away her treasures for the winter. Her work simply stamps the average automobilist with the sign of "piker," to use a slang expression.

Mother Nature never does things by halves, and seldom makes mistakes. The smallest worm, as well as the largest tree are carefully attended to by her, and she seldom allows anything to be lost or to die.

Perhaps you are wondering just how a cocoon relates to an automobile. I doubt very much if any of you spend one-tenth as much time putting away your thousand dollar machine for each winter as Mother Nature does for her seemingly worthless caterpillar. The average autoist takes great pride in his machine. Many of them spend more time working on the machine than they do riding in it, but as soon as snow begins to fall, their interest abates.

No longer can they drive around in their automobile,

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and so they run it into the garage, shut the doors, and forget about it until the coming spring. The intelligent repairman will tell you, if you ask him, that the automobile, if not properly attended to before it is stowed away, will depreciate more during the winter than during a running season. The tires will die; the running parts will rust; the finish will spoil, and the whole car will require possibly a week's more work to put it in shape again than it would have required to have taken care of it properly before putting it into storage.

First Wash the Car.

The tires probably depreciate the most of any part of the car if they are not used; therefore they require considerable attention if one intends to use them for another season. Before running the car into the garage after its last fall trip, the whole car should be given a thorough washing. All of the mud and grit should be removed from the finish, the cushions dusted, the top smoothed out, and the mud and oil washed from tires. Then the car should be driven into the garage, and supported upon jacks such as are illustrated in Figure 1.

Then the tires should be deflated and removed from the car, and again given a very thorough washing, so as to remove any grease that may be present. Place the tires in a warm, dry room until they are perfectly dry. This is important, because if there is any moisture in the pores of the rubber it will freeze and crack open the tire, much the same as water would crack open the cylinder jackets or radiator, if it were left in those units.

Repair the Tires.

At this time, all of the little holes or blowouts should be filled and vulcanized so that no crevice will remain in

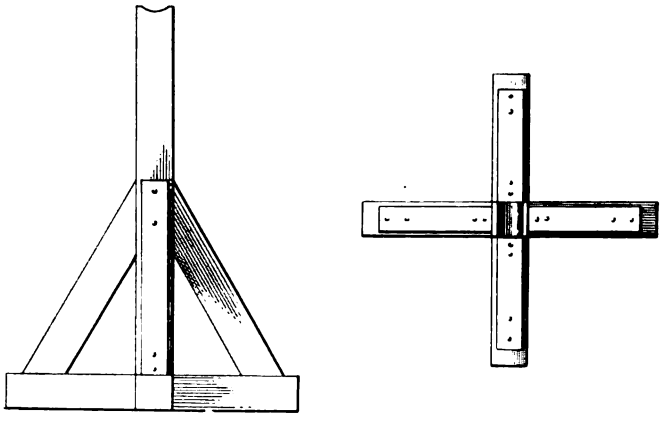


Fig. 1. Construction of a Winter Car-Supporting Block.

which dust or dirt may lodge. Then the tires should be wrapped with a heavy grade of brown paper, as shown at A in Figure 2.

This may seem like a big job to the autoist, but if he will think for a minute, he will realize that he is saving money. Do not all of the tire manufacturers wrap their new tires with paper? Then is that not a good argument in favor of this procedure, for surely a tire is worth just as much to you as it is to them, in fact, it costs you more than it does them to permit a tire to spoil?

Now, there are two ways of storing tubes for the winter. The tubes can be partially inflated, that is, just enough air placed in them so as to prevent their walls from sticking together. Then they may be placed inside the shoes. In my opinion, however, the tubes should be folded carefully and packed away in a moisture-tight box, or in a bag made of rubber-covered cloth.

There is only one practical way to fold a tube, and since so few automobilists really know how, I have drawn a sketch of the various steps and reproduced it in Figure 3. First remove the insides of the tire valve. The top of the valve cap is the special tool used for this purpose, and the insides unscrewed from the case. Then place the tire flat upon a table as shown at A and beginning at the end M, roll the tire up tightly as shown at B.

This procedure will force out all of the air in the tire, and if the tire were unrolled again, of course the air would go back into it again, therefore replace the valve inside to prevent the air from returning. Then unroll the tire and place it flat upon the table again with the valve at the center as shown at C. Fold over the two ends M and N as shown at D, then refold as shown at E.

Do the same with all of your tires and wrap them in paper, or as suggested above, place them in a box or water-tight case and put them together with the wrapped shoes in a cool, dry, dark corner of the garage. Heat, light, moisture or oil cause tire depreciation. Therefore guard against all of these things.

Drain the Water System.

Every automobilist knows enough to drain the water from the cooling system. As a matter of fact, I have always known it myself, but through my carelessness, I once permitted the cylinders of a car which I owned to freeze and crack. I had drained the radiator very carefully, and my surprise was great when I noticed the cracks the following spring.

Investigation showed that though I had drained a portion of the system, there had been a small pocket in one of the cylinders which still held water. Thereafter I always followed the directions of an old automobilist who perhaps himself had been caught at some time or other in the same trap.

"When I put my car away for the winter," he said, "I am always careful to run the car into the garage after the engine is thoroughly heated. While the water is still steaming, I open the drain at the bottom, and draw off as much water as I can. Then I disconnect the rubber fittings, and as the engine is still warm, the rest of the water soon steams away. If there are any pockets, the small amount of water in them will boil very quickly."

Don't make the mistake, however, and start your engine after you have drained off the water, for if you do you will be obliged to buy a new engine.

Have you ever tried to clean a piece of steel with kerosene oil? If so, you may have noticed that though the

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kerosene removes rust at first, unless the kerosene is wiped carefully from the steel or iron, the metal will rust again very quickly. The present-day fuel comes pretty near being pure kerosene. Therefore it is not good policy to forget the lubricating system in stowing away the car.

Clean the Lubricating System.

Remove all the oil from the base of the engine, and pour into the base about two quarts of kerosene oil. Open the compression cups, or unscrew the spark plugs, and turn the engine over by hand one or two dozen times, so as to distribute the kerosene all through the lubricating

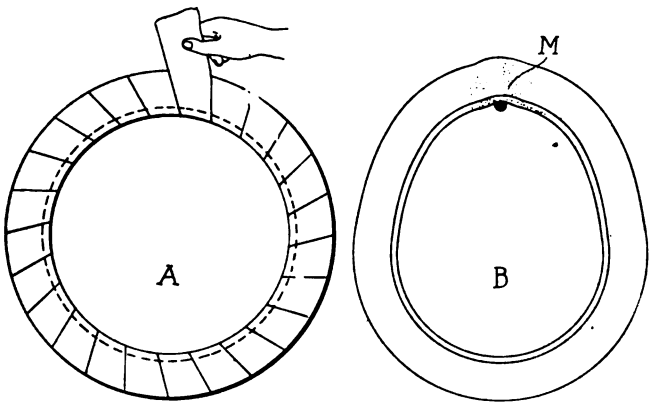


Fig. 2. A, Illustrates Method of Wrapping Shoe for Storage; B, Wrong Way to Store Shoes Hanging on a Peg.

system. Then drain off the kerosene. It is best to turn the engine over once or twice with the drain cocks open so as to remove any kerosene that may be in the oil pump or other parts.

Then fill the lubricating system with fresh cylinder oil to the proper level, and turn the engine over again two or three dozen times so as to distribute the oil to every part. Two teaspoonfuls of oil poured into the top of each cylinder prevents rust from forming on the cylinder walls. Once rust is formed on the cylinder walls the engine is badly damaged.

What is true of the engine lubricating system is also true of the transmission. Both the gear-set and the differential should be cleaned in the same way as has been the engine, with kerosene oil. In every case, however, before putting up the car for the winter, new lubricants should be supplied. If it is practical the engine should be spun a number of times during the winter so as to redistribute the oil occasionally.

There are two kinds of lubricants—one is mineral, the other vegetable oil. The oil left in the engine during the winter should be distilled from mineral base oils, or there is danger of corroding the steel.

Occasionally we find a person who makes a habit of washing his face before he retires at night, and if I am not mistaken, you will find that most beauty doctors recommend this procedure. If I were writing for a magazine on hygiene, I suppose I could add a few more paragraphs along this same line, but there is a parallel case in automobiledom.

One should not retire his car for the winter leaving deposits of oil, grease and dirt on the varnished surfaces. Varnish is peculiar stuff, and no matter how hard it may seem to be, an atom of dirt will work into its surface if left long enough. Greasy dirt will of course soften the finish and destroy its lustre. Washing does not always remove all of the dirt, and you will find it to your advantage to spend two or three hours going over every inch of the surface with a body cleanser or paint renewer of some sort. Be sure to buy a well advertised, and well-known product. After being sure that the surface is clean, a coat of wax (the writer uses Johnson's), helps to keep the finish in condition during the winter.

There is an old saying to the effect that a man is known by the clothes he wears, and as a comparison, one might infer that an automobile is known by the appearance of its top. The shabby top ages a car at least five years in appearance, yet very few automobilists know why the top seems to grow shabby so much sooner than the rest of the car. Carelessness in folding it, or lack of attention when putting it up for the winter are usually the two reasons.

The mohair or lining should be given a good brushing with a stiff whiskbroom just as carefully as you brush your suit before you put it away. Some tops can be sponged with Ivory soap and warm water. There are a number of top preservatives now on the market which could be applied before the top is folded.

The top should never be left open to accumulate dust and dirt, but enclosed in a heavy bag of some sort. A rubber-covered one is much to be desired. The greatest

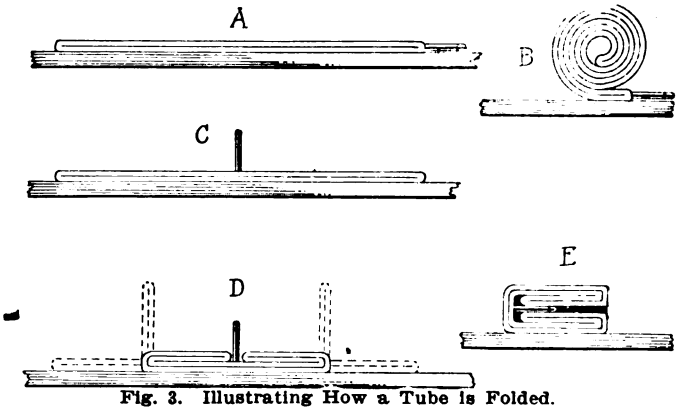


Fig. 3. Illustrating How a Tube is Folded.

of care should be exercised in folding the top else the creases will result in cracks in the waterproof surface. Spend an extra half hour folding the top.

An Excellent Plan.

Now, folding the top when putting it away for the winter is not always the best idea, but if the machine is to be left in a dusty garage, or an unheated garage where there is a chance that the snow may seep in, this method is to be preferred over leaving the top up. No matter how careful one may fold the top, there is always great danger that it may be creased.

If, however, the autoist cares to make the investment, he can purchase one of the large paper bags or paper covers, which are now on the market designed expressly

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for covering the cars during the winter months. When these covers are used the tops may be left up, or they may be removed from the car, stretched open, and placed over the seats. In this way, they do not take up as much room as ordinarily.

Few motorists realize that the storage battery requires particular attention if it is to be left for any length of time. The electrolyte in a fully charged battery will not freeze, but if the battery has been allowed to run down, there is danger that the liquid in it will freeze and damage it. Therefore it is always best to have the battery fully charged upon storing the car, and every month thereafter, test it to be sure that it is not discharging itself. The storage battery stations in practically every city will store a battery during the winter at a minimum price. In any event, do not leave the battery upon the car unless the car is kept in a heated garage, but remove it and place it in a building in which the temperature seldom drops below 50 degrees.

Exposed metal parts of the car are very apt to rust unless some means is used to protect the parts. The rims deserve special attention. Remove all of the rust with kerosene oil and a scrubbing brush, or special rust remover, and give the rims a coating of special rim paint. The other exposed portions of the metal work, such as hinges, steering gear shafts, etc., may be coated over with a mixture of paraffin and gasoline. To prepare this mixture (which by the way makes an excellent squeak preventative), heat a pail of water, and when it has been brought to a boil, remove it from the stove, and place in it a can of about one-half a teacupful of gasoline. Dissolve in this gasoline as much paraffin as possible, in other words, make a saturate solution. Then add about four teaspoonfuls of gasoline to prevent the mixture from solidifying, and paint the exposed metal parts with it. Incidentally, this same mixture can be used around the house for coating slides, draws, hinges or any parts liable to friction.

Holiday Show Window Advertising

It Is the Man Who Takes Off His Coat and Gets Down to Real Hard Work That Sells the Goods.

BY FRANKLIN MYERS

NATURALLY a man who is used to getting up window displays finds but little difficulty in thinking up an idea that will catch the eyes of the people. He is used to it—he has the courage of his convictions and, working upon the plan of "he who hesitates is lost," goes straight to work on the idea that strikes him as being good and eliminates all doubt as to the drawing power of the display.

This absolute decision on his part makes for a better exhibit because he allows no misgiving to bother his work—bestowing full concentration of the mind on the matter in hand compels the window display to be what he means it shall be—a successful, money winning show window. I know of many retail accessory dealers who have splendid ideas but not the time to execute for the actual display. Where they fail is in throwing away this gift of originating by not having a good sign man to do the practical part of the work for them.

There is nothing in the world that cannot be had by the man who is big enough, daring enough, optimistic enough to want it hard enough. Not a single achievement, nothing has been done that cannot be done again, and perhaps better, the second time than it was the first. I am always glad when I see a store that has been practically dead or anyhow badly crippled by lack of enthusiasm—come back to life and smile. There once was a retail accessory dealer in a Southwestern city who was never known to smile. He was never known to put a sign or show-card in his store window. He called everything pertaining to advertising humbug.

Naturally this man's business was fast asleep—in fact, people wondered how it lived at all. The old gentleman used the word humbug so often that friends and intimates used to call him "Hum" for short. This man had a splendid location, but the people would not patronize the store because they got the impression that "Hum's" goods were back numbers and shopworn—see?

They judged the goods by the store, and if the truth were known, I am led to believe that the people in his neighborhood knew what they were about.

One day the old gentleman's son came home from college to stay and the first thing I knew the store was given over to the young man to run as he saw fit. This young man had the advertising instinct very strongly developed, naturally. The old sign came down and up went another, and it read:

"HUMBUG" HOWSON'S SON,
"THE HUMMER"

You see, the young man built upon the old gentleman's eccentricity—it was double advertising, for everybody knew "Hum"—so now, too, they were to know "The Hummer."

The old store was remodeled throughout—fresh stock and everything up to date. Everywhere within a radius of twenty-five miles "The Hummer" became known as a live wire, and to-day he is the sole proprietor of the largest retail auto accessory store in that State. He has made a young man out of his father, too, by teaching him how to smile. "The Hummer's" sign always brings a smile. Automobilists were so attracted by it and by the

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proprietor that the store is a popular stopping place, and "The Hummer" caters to their wants.

All his advertising is of the pictorial order and he keeps one man at work all the time just creating and arranging "cut out" show window displays and hand-made posters.

This reminds me of a poster campaign I undertook after two other artists had fallen down on the job. A very large trade journal in New York City conceived the idea of selling to the retail dealer a spring poster, the subject to be an up-to-date, stylishly-gowned young lady riding in an automobile and throwing open the gates of spring amidst a profusion of spring blossoms, etc.

As the head of the art department, I was compelled to listen to the general conversation regarding the matter while the two artists were trying to figure out how to get the posters out in quantities.

No price had been mentioned—the whole scheme seemed to hang fire because no way could be found to turn them out by hand fast enough so that possible customers could be supplied and no disappointments registered. Naturally, the firm did not care to start something it could not finish.

I was too busy to make any suggestions had I been asked, and consequently gave the matter hardly any thought with the exception that I knew it could be done. I had no private studio large enough to handle poster work in, but I did have at home a very large parlor. All right, that would do nicely.



An Attractive Window Display to be Made by Any Good Artist.

Did you ever see stage hands "hit a scene?" Well, that's when they change the stage from one set to another set or scene. It's rapid work, and you don't want to be hanging around the stage at that time or you'll go down a flight of stairs on your head in a hurry.

Well, that's about the way I struck that parlor of mine

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—cleaned it out, covered the carpet with canvas, bought forty dollars' worth of colors, brushes and super-calendered paper; mounted the paper up on a table, so that it would unroll easily, cut the paper into proper lengths of three-sheet size; three sheets of this size pressed to the side wall with thumb tacks and I had a nine-sheet poster in blank form ready for the drawing.

I already had the lady and the gates cut out of medium-thick cardboard (life size) in outline, so all I had to do was to place these cardboard forms against the paper, put in a few thumb tacks to hold them in place. In three minutes I had the lady, the automobile and the gates in pencil outline and was ready to use color.

All in a row to my left were the colors arranged and a brush in each color pot. The background of blossoms



was painted in first, the gates next and the lady and automobile next, dry scenic color being used. This medium is always mixed with glue and water and is all right for inside work, although aniline colors are sometimes used. For outside posters, printer's ink thinned or reduced is the proper medium.

One hour and a half to each poster, and I sold them at ten dollars each, and the stores were glad to get 'em. I had not mentioned anything to the firm about my plan or my preparations or anything else.

I simply placed the work before them and asked them if it was what they wanted. Why, of course, it was what they wanted! They started full page ads, going right away upon my promise to fill every order that came in the house.

I was already ahead of the game, for I had twenty ready for shipment. I am a great believer in high quality commercial art. These posters were made good and we did not have a single complaint or adverse criticism.

When in doubt take off your coat and pump in; forget the doubt and do the work. When I sat down to write this article I had no idea just what I would put down, but I had been thinking while at my drawing board in the forenoon how slow human nature really is, and no man is exempt.

Often I find myself retarding my own business by neglecting to make connections as quickly as I ought—bad, very bad habit to get into. Of course, I don't believe it is necessary for a man to get heart disease rushing things, but by keeping up a certain speed regularly it soon gets to be a very desirable habit.

The two artists who failed to land the contract for those posters lost just eight hundred dollars. They knew the method of procedure; they knew how it could be accomplished. I wasn't any brighter or smarter than those boys, but they looked at all the special preparations as if it was a mountain. They made it a mountain whereas if they had exercised their God-given power of will they could have removed the mountain.

Pessimists are not born, but they are made through just such incidents as these. After awhile "nothing is any good;" all contracts are too much trouble; "there's nothing in it, anyway;" "business is all out of gear;" "what's the use?" and all the other excuses until the man becomes a grouch, wears a long face or a discontented look and either becomes a drifter or stays in a rut.

All this when a little grit and determination would have kept the countenance in a refulgent glow and the hand clasp as hearty as ever. You can pick out the shirkers in any big city. You'll find 'em in little dark, pokey, old-fashioned offices; got a few hard raps and never fought through 'em—"nothing is any good"—"what's the use?"

Every success can be repeated by the man who wants to repeat it and works hard enough for it. In the working for it lies the rub. The reason for our failures lies in this: we have not worked hard enough. Faith, daring and hard work have conquered every element—the land, the water and the air—have done things men said were impossible and that men were not intended to do.

It is very refreshing to meet a man who can and will do things in a thoroughly whole-hearted manner—and as a rule these men are magnetic.

I was busy in my office one day in the old Times Building downtown, where I was in the habit of meeting many of the biggest advertising men of the day. In those old days an advertising specialist was a sort of a curiosity; the game was comparatively new and folks would come in from the West and South to see Mr. J.

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Walter Thompson on the floor below, and they would also manage to get up to see me occasionally regarding copy. The best engraving at that time was done out of town—Philadelphia, for instance.

A man from that city came in one day and started in to talk engraving. I was a big user of photo engraving and was always a willing listener for any new stunts that were being put over. The young man unfortunately did not happen to be representing the right house. The work was inferior to what I was getting, and I frankly told him so, but he was insistent that his firm's work was better and went into details in a quiet way. He was a good talker, a convincing talker, and took away a good sized order.

It was not until he was gone that I suddenly came to the conclusion that he was absolutely personally magnetic. I knew his firm's work was not as good as what I'd been getting, and still the man had taken away an order, and I seemed willing to let him have it, and now that I come to think of it, I really believe if he had made a touch on me for a "ten spot" he could have had that, too.

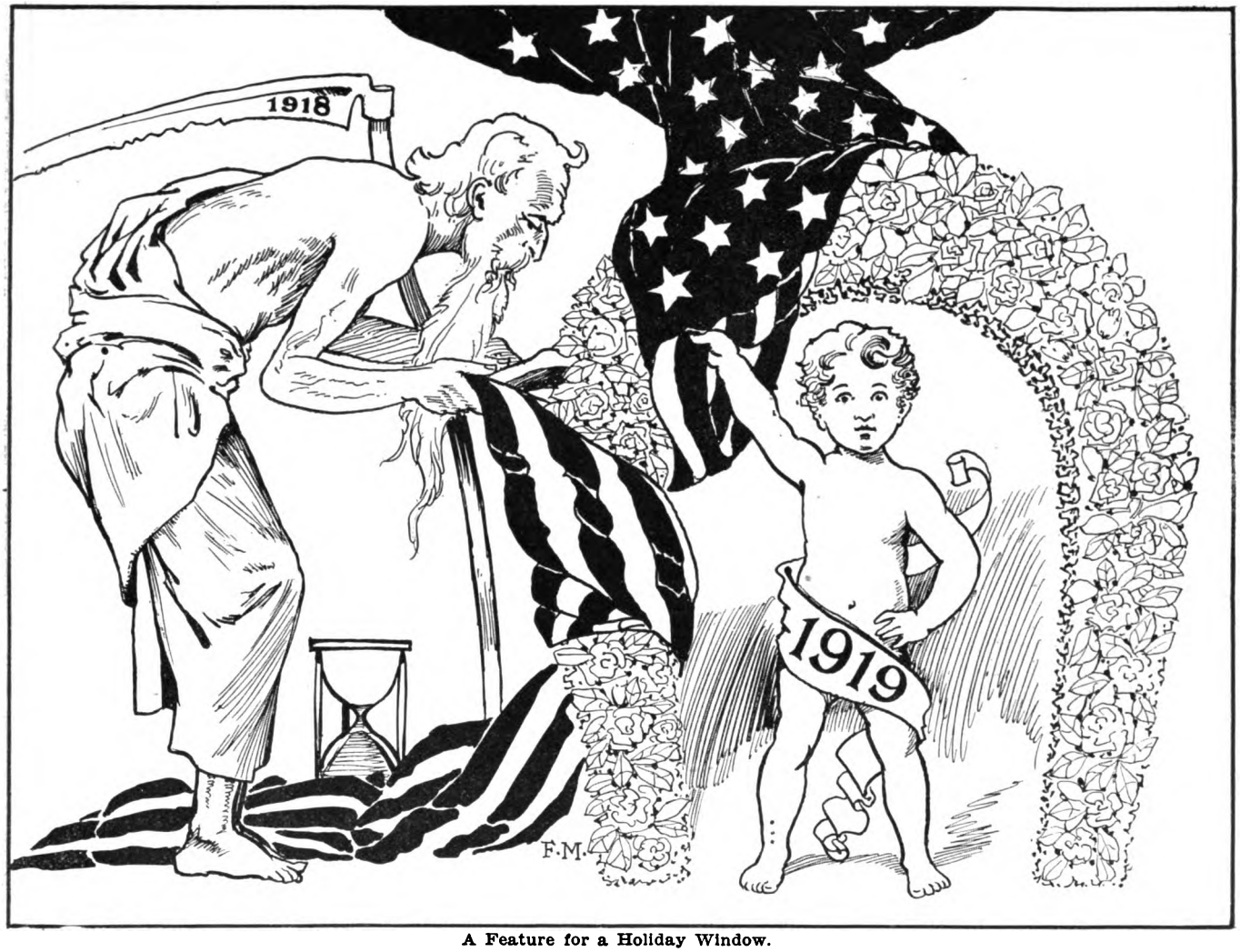
I was in need of a good outside man at the time, so I came to the conclusion that he was going to be the man. I telegraphed him to come to see me at once on a matter of importance. He arrived in due season and I looked him over carefully and noticed for the first time that he needed a new suit of clothes, although he did have a shine on his shoes.

"Mr. Marvin," said I, "are you satisfied with the position you have in Philadelphia?" "Well, to tell you the truth, I am not," he replied, "although the folks over there seem to be satisfied with my work, but I'm only getting fifteen dollars a week."

I started this young man on twenty-five dollars a week, banking on a discovery—that he had that rare quality—personal magnetism.

He didn't know a thing about my end of the game, which was special advertising. I took him on a tour through the clothes and haberdashery shops down town, and the last stop, as I remember it, was Young's hat store right opposite the Times Building, in Nassau Street. High hats were common in those days during business hours, and I insisted that he looked good in a high hat, so he fell for it. I put a gold watch in his pocket, because as I told him, "you're going to meet some big people and you'll feel just as big as the other fellow if you've got some of this junk hanging on your frame."

We came back to the office, and as I had nothing very special prepared for him to show at the moment, I picked up a trade journal lying near at hand and tore out a page



A Feature for a Holiday Window.

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advertisement that was carrying matter on shoes. It was a pictorial page, so I had the tip right there—that the house was probably a live wire for illustrated ad "stunts."

"Go up and see this man, Mr. Marvin," says I, and—just then an idea for a shoe booklet popped into my head, so I said: "Wait a minute; I'll sketch out a booklet in rough layout form and it will give you an introductory talking point." I finished the layout and passed it over to him "for better or for worse."

He started towards the door and I noticed his every move till he got in the elevator—no affectation, no braggadocio, no feeling that he was dressed up; why, the man looked as though he had worn and had good things all his life instead of going around as an apparent misfit. Anyhow, he didn't miss the fit he had in that suit of clothes. He was gone about five hours, although the man he was to see was only about six blocks away from the office.

I began in my mind to say good-bye to the one hundred odd plunks I'd blown in on the gentleman's front, inasmuch as I hadn't even asked him for references. He



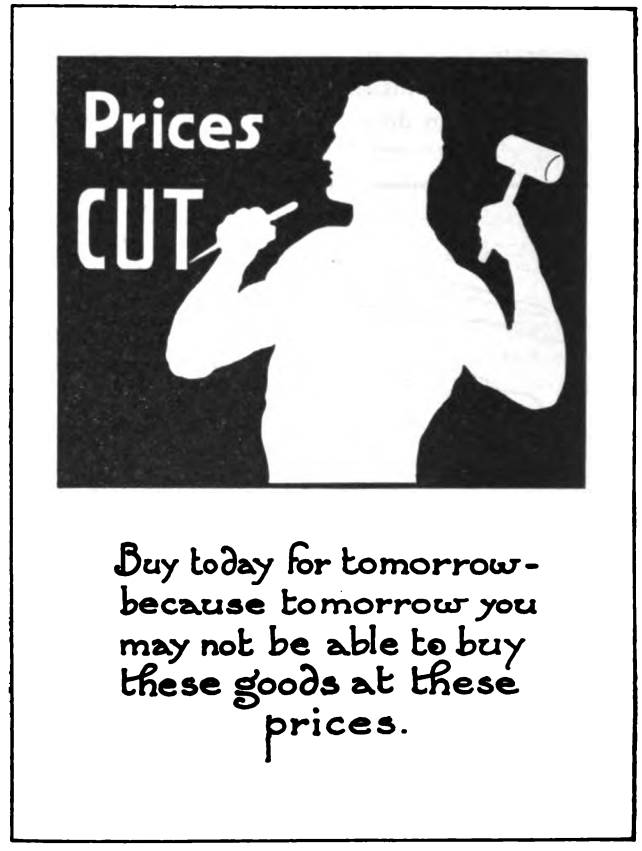
looked good to me and I was always willing to take a chance.

I was getting restless, and was just about to go over and have a chat with the late Joe Howard, the newspaper man, across the hall, when in popped Marvin.

"I met one of the finest gentlemen you'd want to talk to." That's the way he started, and then he went on to tell about how long the man had been in business and about the man's son and about their wonderful line of stock, and then again about the man, the old gentleman himself, what a fine man he was.

"I believe you, Marvin. I believe all you say, implicitly, but did he give you a look-in on any business?"

"Oh, that's all right," says Marvin, "I've got an eight



thousand dollar contract for advertising on all the Brooklyn car lines, but you'll have to come with me to-morrow to see this fine man and have the contract fixed."

At that time this was the largest order I had ever taken, and I nearly dropped dead. We talked over things for about an hour; I had forgotten all about the booklet layout I had given him.

He was looking over some papers and things he had taken from his pocket until he ran up against the booklet. He put it over to the side carefully with the remark that "they would like to have one hundred thousand of these little booklets as soon as possible."

Later on in the day, as we neared quitting time, he had the cheek to say to me in the most ordinary way possible: "Is what I've done to-day any good?"

I assured him that he was *IT*.

I asked him if he knew that he possessed personal magnetism. He said that no one had ever mentioned the fact to him. To cut a long story short—he was so good I took him in partnership.

This young man's secret, if it was not personal magnetism, was surely unlimited enthusiasm with and a great liking for his fellow-man.

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Taken From a Mechanic's Note Book

Let Us Open the Memorandum Book of a Repair Man and Read What Dame Experience Has Taught Him.

BY J. FRED GILMAN

HEIGH-HO-HUM! December is here. The month of memories, of gifts, of Christmas and plum pudding. It marks the passing of BVD'S and other flimsy furnishings and the advent of sheep-lined lingerie and coal bills. Even if the war is over, the battle cry of "Feed 'Em" is becoming more and more of a problem every day, and America is, after all, the only real land of plenty in this hungry old world. It seems only yesterday that we were looking at the thermometer to see how hot it was, and here we are taking another look to see how cold it is. Which reminds us of the fellow convalescing from an automobile accident who said he knew he was going to have a smash-up, for his brakes wouldn't hold. When he was asked why he didn't jump before the wreck occurred, he said before he could pick out a good place to jump he had gone by it, upon which we will open our note book.

* * *

Cleanliness in the Open and Closed Car.

To clean the automobile properly is one of the most important things for the owner to know, for the longevity of the car depends to a great extent upon how carefully this is done.

Dirt is a great little destroyer of polished surfaces and of machinery, and the automobile is composed of both. You, of course, have heard of the Gold Dust Twins, but have you heard of the Gloom Twins (Dust and Dirt)? These two gloomy twins, like the modern cootie on the doughboy, put in their deadliest work on the body and running gear (of the car), and they devour paint, enamel and varnish. BUT, it is easy to remove them—provided you do it right.

There are several ways of removing dust and mud. One is to use water. The other, which is newer and much better, is to spray the dirty surface with a special preparation which softens the hardened dirt, and it is then wiped off with a cloth which takes the dirt with it.

If you use water, be sure to use it plentifully, especially if the car is clotted with mud. Any attempt to remove mud before it is thoroughly softened will damage the finish of the car. In using the hose be sure to remove the nozzle and flow the water over every part of the body. This serves to wash off as much of the dust as is possible and to loosen the mud so that in a little while it may be flowed off.

It is best to start at the bottom of the car and work upwards—in this way you clean the running gear, which is usually the muddiest—first and by gradually working upwards you avoid splashing muddy water on an already cleaned body. Use a soft, clean sponge and following it with the hose go lightly over the body. If portions of the body are grease spotted, they should be separately washed in pure water and castile soap, but never use a soft soap or a soap solution above the chassis. Never allow the water to dry off naturally on the bodywork, for should this happen your car will begin to take on the spotted appearance of a leopard.

Lastly, give the car a second quick rinsing over with the hose and, starting at the highest point with a piece of chamois, dry all the moisture from the body. If the engine is hot when you begin the drying process it is best to start with the hood to prevent the heat from drying it.

When grease and road oil collect on the chassis it requires more vigorous treatment and separate tools. An alkali soap is necessary, and is best made by dissolving a pound of soap (either soft or cake) in a gallon of warm water, and this preparation may be used to advantage on the chassis. A hard stream of water may be slanted against the wheel hubs but never directly against them for water will be washed into the bearings in this way.

Those that use the spray system for cleaning automobiles claim that by its use the danger resulting from a wholesale flooding of water is avoided and that the liquid preparation acts as a preservative for the varnish and enamel, which water does not. This spray method is much more convenient, requiring only the spraying of the car and then wiping it thoroughly with cheesecloth.

The automobile's upholstery should be daily brushed with a stiff whisk broom, and whenever possible a vacuum cleaner should be run up and down and into the cushions, which, by the way have a habit of absorbing the dust and dirt. A leather top should be wiped with a damp cloth, but be sure to dry it thoroughly before folding it down again, for should even the slightest trace of moisture remain you will find it covered with mildew when you go to put it up again.

Mohair cloth and other composition tops should be well brushed and occasionally beaten.

Slip covers if not kept clean will look worse than old upholstery and should receive frequent and special attention. Spots can be removed with gasoline, and beating from time to time, or better still treating them to a vacuum cleaner will make them add to the appearance of your car.

The best way to go about the cleaning of the closed car is to adopt the tailor or dry cleaner's methods. It is essential that the car be in a good light for it is almost impossible to accomplish anything like good results with

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artificial light. The dirt should first be removed thoroughly from the seat cushions and upholstery and here again lies the value of the vacuum cleaner for the best results obtainable. Purchase the highest test or volatile naphtha or ether you can obtain, at the nearest drug store, for the low test gasoline which you purchase at a garage or service station may perhaps clean in a satisfactory manner, but the odor left will take many hours, even a day or two to disappear entirely, and there is the danger of leaving a ring mark upon the upholstery.

Use as little cleaner as possible, the less the better the finished job will be and the less chance of grease stains, the idea of this kind of cleaning being to loosen the dirt and grease so that much of it will adhere to the bristles of the scrubbing brush rather than soak into the upholstery which is being cleaned. Herein lies the reason for not using much gasoline nor attempting to do the work in a hurry.

Dip the brush in a pan of ether or naphtha and shake out most of it. Then start scrubbing the soiled seat or cushion, scrubbing on one side of the stain and working gradually towards the center. Work fast and scrub hard if you find it helps. In about half a minute you will notice that the bristles of the brush have become dry through the evaporation of the liquid.

Stop scrubbing and wash the brush carefully in a second pan. The amount of dirt collected will surprise you. Dip the brush in clean liquid, shake well and continue as before. Be careful in your hurry not to neglect washing the brush frequently, and be careful not to do too much scrubbing in one spot. It is much better to go over the entire area soiled and then permit the cushions to dry, in order to note if all the stains have been removed. After the portion scrubbed has dried a few spots or stains may show, but these can generally be removed after a second treatment.

It is always advisable in the case of velours to remove the dust with a vacuum cleaner and then smooth down the hairs with a piece of the same sort of material. Dust should never be allowed to collect around the pleats for a longer time than twenty-four hours. The cleaning of the car is not a difficult task. You have only to observe some of the few simple methods of the tailor.

The man who thinks that the varnish on his car is simply to make it nice and shiny is mistaken, for the primary function of the varnish is to protect the color underneath. The owner who would conserve the finish of his car and save expense by frequent repainting should see to it that this varnish skin is never broken and never allowed to wear through.

Ordinary washing and polishing will wear off the varnish in spots in about six months' time or a little more. So, Mr. Owner, to be on the safe side the car should be revarnished twice a year. Thusly the color underneath may be made to last for an indefinite period.

Do you know that only one car owner in ten understands the numerous details of his automobile? Of course they know how to start and stop it but when it develops mechanical trouble—blooy, there goes out upon the still air an S. O. S. call for a mechanic which sounds like a strickened liner that has just been submarined.

Don't laugh, reader, but just figure out where the shoe pinches most. Imagine, only the other day a fellow that told us, as his car was being towed to the garage, that he thought grease and oil were attended to by the makers of that particular machine and that he had only to fill it with gasoline. Our Editor can show you in his "Automobile Graveyard" a thousand instances such as this.

A lack of oil, and cooling troubles, are usually indicated by the engine missing, by knocks and a loss of power. These danger signals must not be ignored, for in fact a knock, however slight, is a forecast of troubles soon to occur and a thorough investigation should be made at once.

If oil contains grit or dirt of any sort, or if it is not clean, it will wear away the metal parts, the foreign matter acting as an abrasive. Oil contains a certain amount of gasoline, making it incapable of resisting the pressure between the rubbing surfaces.

The severest test of a lubricating oil is found in oiling the pistons and cylinder walls, especially at the end of the up stroke. At the moment of combustion the temperature is above 3000 degrees Fahrenheit and both pistons and cylinder walls are very hot, so it is very necessary to use an oil which will withstand this temperature without vaporizing or burning. If the oil is too thin or has a tendency to vaporize or burn, these high surfaces will not be properly lubricated and increased friction will result, and finally the friction between the two surfaces that ruin these parts.

The minute the sight feed of the oil reservoir indicates that the oil is not feeding fast enough the trouble should be located before the car is run further. Should this not be done there is great danger of the moving surfaces going dry and therefore becoming burnt out. Scored bearings will be the result if this feature is neglected.

The oil tank should be kept filled and one should be sure that the lubricating system is working at its maximum efficiency. If too little oil is used the car will suffer; if too much the oil will make the car smoke and then you are open to a summons to appear before the local court. It is a good plan to fill the oil reservoir at a certain time each day, so that there will be no chance of the car going dry.

Examination of cars in different parts of the country show that grease cups, gear boxes and differentials lack the attention due them, because the owner is a bit lazy and that these parts of the car are somewhat inaccessible.

True is the saying that "out of sight, out of mind," and many drivers still retain the impression that grease cups were placed upon the car for ornaments, but these drivers always pay for their neglect in the end because this inattention always results in the wearing out of these parts much faster than they should.

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Freezing the Automobile To Death

If You Intend To Operate Your Car During the Winter, You Can't Afford to Miss This Article.

BY F. L. PHILLIPS

I SUPPOSE that there are many motorists who have carefully filled the radiators of their cars with an anti-freeze solution, have left their cars outside their houses for a few hours in zero weather, and have discovered that they needed a cylinder block or cylinder head, or possibly a new radiator.

If this hasn't happened to them, there is a possibility that they have gone into their garage some morning to find their radiator a mass of ice and the engine ruined. These motorists have immediately raised the question, "What can I do to prevent the cooling system from freezing? I carefully followed the directions which I found in a number of the magazines, mixed up the right preparations of alcohol and water, and yet here I am with a frozen engine. Evidently the magazines are not to be depended upon."

It is no wonder, then, that these motorists cease to place faith in signs and reading matter. As a matter of fact, however, they failed to realize that though in the beginning they followed directions and really did mix up the suitable anti-freeze solution, as time went along, their anti-freeze solution became nothing more or less than just plain water.

Combinations of alcohol and water, and alcohol, glycerine and water answer the purpose when they are first mixed. Many drivers place their confidence only in such liquids, and if these drivers "watch their step" they get through the winter with an undamaged machine.

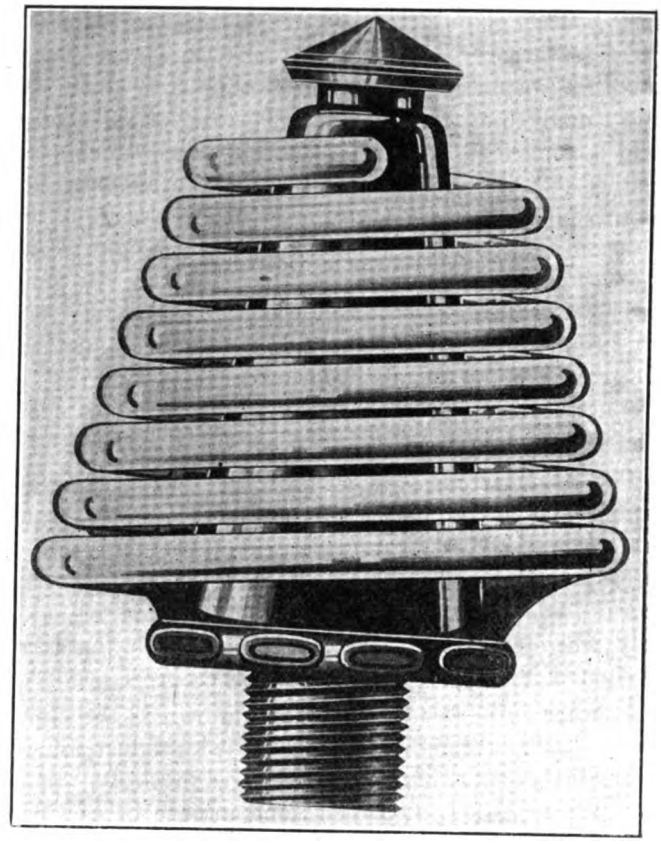
Alcohol Evaporates Rapidly.

The one property of alcohol is that it will evaporate at a comparatively low temperature. The vaporizing point of this liquid is 173° Fahrenheit. Just tuck this little figure away in your brain somewhere, so that you will remember it, then listen to the following little facts about cars.

An automobile engine requires a certain amount of heat to be at its maximum efficiency. Though this point is between 200° and 300° Fahrenheit, manifestly it is impossible to obtain such a condition without boiling water, therefore a water-cooled engine will give the best results when the water is at a point between 170° and 190° Fahrenheit. If the temperature goes above this point, the water will be dissipated. Below this point the efficiency of the engine drops.

With this fact in mind, the manufacturers of the higher priced cars have equipped the cooling system of their machines with a thermostatic control. When the engine is started, the thermostat valve is closed and by-passes the water from the engine to the pump without admitting any of it to the radiator. When the temperature of this small body of water rises to about 180° the valve opens, and water passes through the radiator.

One can see, then, that the tendency of this control is to keep the water in the system very closely to 180°, or nearly 10° above that at which alcohol vaporizes. Now, I do not mean to say that all engines are fitted with thermostats, but many of them are, and though the thermostat is set at different points in different engines, the theory is the same, and in such engines an alcohol freezing solution quickly loses its alcohol content.



The Burke Condenser.

Of course, as soon as the alcohol is dissipated, the freezing point rises until eventually nothing but pure water is had, with its freezing point at 32° Fahrenheit. Now in any car a similar condition obtains. The cylinders fight with the radiator, so to speak; the cylinders heat the water, the radiator cools it. At any rate, the alcohol sooner or later is dissipated into the atmosphere unless some means is used to prevent it.

A Peculiar Device.

We take the liberty of reproducing in this article a picture of the Burke condenser, a device which deserves special mention because it is unique in this way. When

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the alcohol is vaporized by the heat from the engine, vapor naturally rises and finds its way into the many coils of this condenser. Since the coils are exposed to the air, they present a large cooling surface and the alcohol is thereby condensed and drops back into the system, mingling with the water and preserving the alcohol.

The motorist who prefers to use an alcohol solution for his radiator should by all means adopt some such means as this to prevent the alcohol from being dissipated. The great reason why motorists, especially those of the old school, prefer the alcohol solution is because they know alcohol will not damage the radiator, the engine jacket, or the cooling system fittings. It does not have a chemical action upon any of the fittings, nor does it leave deposits in the jackets.

There is another argument which they often bring forth. They claim that some of the solutions which may be mixed are very apt to "find" leaks in the system. A small leak often will clog itself up with dirt or corrosion, and usually the leak will cease unless a strong alkali or acid is applied to it, when it again appears. Alcohol has neither acid nor alkaline action, and is preferred by many motorists for this reason.

Anti-Freeze Solutions.

There are on the market, however, a number of standard products which may be mixed with the cooling liquid. One can make no mistake in using a nationally advertised product. In using such liquids, however, one should observe closely the directions of the manufacturers.

The manufacturers of Johnson's Freeze-proof preparation have guaranteed their product to give absolute protection to radiators at any temperature. This product is easy to use, and needs only to be once dissolved in the radiator water. Thereafter water need be added only when required. The freeze-proof solution is not dissipated, even at high engine temperatures.

Another anti-freeze combination, known as the Northwesco 1220, is a nationally advertised product and requires little or no time to prepare. With alcohol costing as much as it does at present, and in face of the many difficulties encountered by its use, the motorist surely should investigate such anti-freeze solutions.

There is no excuse for a driver to "freeze his car to death," nor is there any excuse for him to permit the solution to evaporate. A few minutes taken in looking after his machine every week amply repays him for the time he has spent.

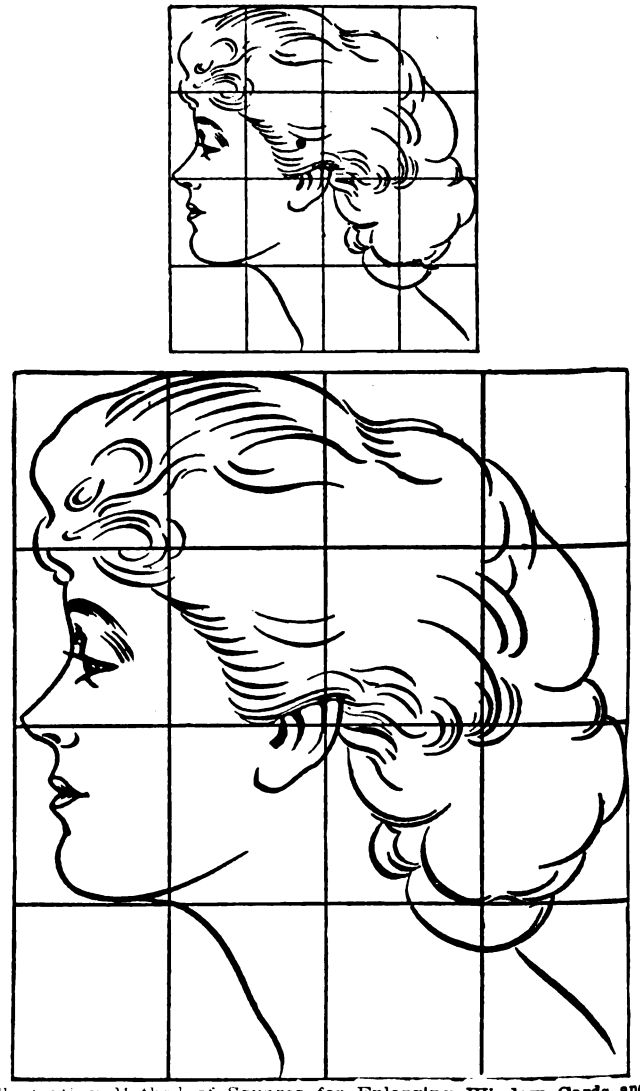
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THE SYSTEM OF SQUARES.

For Enlarging Pictures to Poster Size.

Note the two squared-off illustrations showing the young lady's head—the artist has made the larger one from the smaller, making his enlargement twice the size of the original.

Box in your picture by drawing a line entirely around it—then divide the box up into squares as per illustration No. 1. If you desire to enlarge a print to say three times the size of the original you have boxed in, simply advance the measurement to three times the width and three times the depth. Then divide the enlarged box, 2, into the same number of squares as contained in the original box.



Illustrating Method of Squares for Enlarging Window Cards and Designs from Our Illustrations.

Next draw the outlines of your original picture into the large squares just as you see them in the small squares, and you will find your proportions to be correct and your picture the size you desire for (in this particular instance, for illustrating the modus operandi) a display card.

For poster or window attraction size make your enlargement twenty times the size of your original print.

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Putting a Piston In Its Place

How an Ohio Garageman Adjusts Bearings and Holds the Bolts While the Nuts Are Being Put Into Place

BY JAMES F. HOBART, M. E.

AFTER a rod bearing has been fitted to the crankshaft, how many times do you have to remove the cap bolts and take out or put in liners? If you have to remove the cap bolt nuts more than twice, then you are doing more work than is necessary and you should look about for an easier way. "Liners" ready cut to size may be had for most cars. These liners, the thin ones at least, made of brass, are of varying thicknesses from .002 of an inch up.

Recently the writer took notice while a garage man put in several pistons and adjusted the rod bearings thereof. The pistons, with rods attached, had been placed in a row upon the bench and were standing upon a piece of board which had been freshly planed. The workman selected the piston nearest to the coupling end of the crankshaft and slipped a couple of old bolts through holes in the coupling, then took a pry with a hammer handle between the bolts and revolved the crankshaft until that crank was uppermost where the piston was to be inserted.

He examined the piston carefully for particles of dirt, finding none, but he did find that one of the rings had been removed, from the second groove next to the rod end of the piston. A ring was lying on the board adjacent to the piston taken. The workman placed one side of this ring in the piston groove and then rolled the ring around the piston in the groove, to see that the ring was the right size.

Finding the ring a good fit in the groove, he presumed that the ring belonged there and proceeded to put the ring in place in its groove. He slipped the ring over the rod and let the ring slide down against the piston. Then he pressed the end of the piston against the cylinder housing, which had been placed upon a box during the overhauling of the engine. The workman then caught the end of the connecting rod against his body and thus held the piston between his body and the engine, leaving both hands free for manipulation of the ring.

Putting a Piston Ring in Place.

The thumbs and all the fingers of both hands were pressed against the ring, which expanded under the pressure and slid over the end of the piston. The ring was pushed easily and evenly along the piston until it came up against the first ring, which was in place in its groove. Then some of the fingers were used to compress the first ring, other fingers to slide the loose ring over the one in place, keeping the ring parallel at all times and taking care that one side did not slide ahead of the other side of the ring, thereby bringing undue strains upon it.

As the ring approached its groove, the workman took extra care to slide the ring evenly, so that when it finally slipped into its groove it went "all over and at once" and fell cleanly into the groove without any part of the ring having a chance to catch upon an edge of the groove and thus, perhaps, bring a twisting stress upon the ring.

The piston was pushed down evenly and squarely into its cylinder, and as ring after ring came against the end of the cylinder, the workman would press his fingers against the ring on either side, compressing the rings sufficiently to enable them to enter the cylinder without danger of damage to a corner of the ring. Some of the rings would slide right in, following up the slight bevel or chamfer with which the open end of each cylinder was finished, but if a ring did not at once slide in easily the workman put down his hands and compressed each ring as above described.

After the rings had been put in place, and before entering the piston into its cylinder, the workman covered

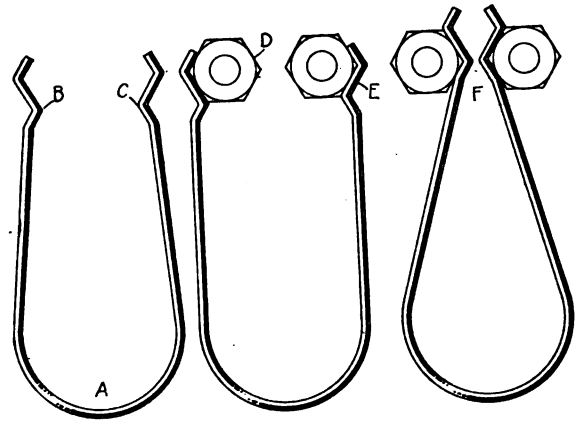


Fig. 1—A Handy Device for Holding Nuts.

both piston and rings liberally with oil, a squirt can filled with crankcase oil being kept handy for that purpose and a liberal portion was squirted into the cavities besides the several rings, after which the body of the piston was liberally covered with the oil, which was spread around by the fingers until all parts of the piston had been covered with it.

After the piston had passed far enough into its cylinder, the rod was straightened out and the bearing brought up against and under the crank, the friction of rings against the cylinder walls being sufficient to hold the piston at any part of its stroke. Some of the brass liners having been already put in place according to the workman's idea of how many would be required, the cap was put in place, and a bit of trouble met with right there, by the sliding down of the cap bolts, some of which would not stay up in place.

A bit of very thick grease was daubed upon the cap

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bolts just below the head of each, with the idea that the thick "dope" would prevent the bolts from sliding down. This treatment held three of the bolts, but the fourth persisted in sliding down until the workman hunted out a tool shaped as shown at A, B and C, Fig. 1. This tool was made from a bit of steel tape about a quarter of an inch wide and less than a sixteenth thick.

The ends had been drawn down thin and pointed as shown at B and C, then the ends were bent as shown, in such a manner that they would not slip off of nuts whether applied thereto on the inside or on the outside as

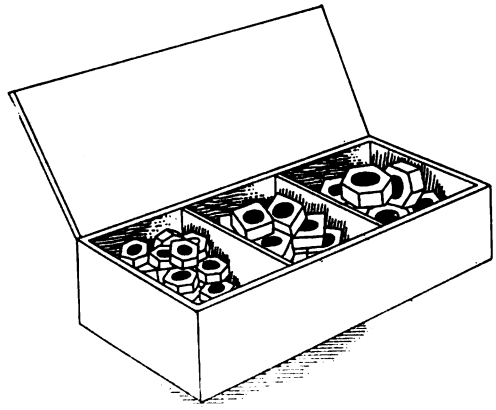


Fig. 2—Small Boxes Are Handy Nut Containers.

shown at D, E and F. When the bolts to be held chanced to be wide apart the clip was slipped over them, on the outside as shown at D and E, but when the bolts were near together the clip was slipped between them as shown at F, and in either case the stiffness of the clip, its spring, served to hold the bolts securely against their slipping out of place while the cap and the nuts were put on.

Adjusting the Caps.

The cap bolts stayed in place after a clip had been adjusted and the nuts were put in place, run down by the fingers, then given a few turns with a socket wrench, the end of which had been turned out for a "T" handle, five inches long, projecting equally on either side of the central rod of the wrench. The nuts were turned down evenly, the workman going around once lightly, then he set the nuts home as hard as he could turn with both hands on the wrench-handle.

A socket wrench with the handle bent over 90 degrees was then used and the castle cap nuts set home as snugly as a fair pull with one hand on the end of the 10-inch wrench would send the nuts. With a hammer the workman then struck a couple of blows fair on the end of each castle nut, to settle the bolt firmly into place, then the hammer was used to strike upon the cap, at the same time holding the fingers of the left hand against both bearing and crank and noting the vibration, the movement between the two, when the blows were struck.

Blows were also struck against either side of the cap, driving it in the direction of the crank length, the fingers being in place to detect any movement between crank and bearing as the blows were struck. During the several adjustments, watched by the writer, not quite enough liners had been inserted and the cap pinched the crankshaft so tightly that the liners were loose and there was no vibration between the cap and crankshaft when the test hammer blows were struck.

The cap bolt nuts were removed, a few more liners put in and the nuts replaced. This time the hammer test showed slight movement between the crankshaft and the cap, showing that too many liners had been introduced. Here the workman got his cue—before two liners had been introduced, the cap screwed down too tight. With two more liners in each side the cap was too tight and these two trials demonstrate that the limit of proper adjustment must be within that limit. Therefore, the cap bolts are removed, one liner .002 thick was taken from each side of the cap, then when the nuts were replaced and screwed home the hammer test showed a correct adjustment of the bearing for that connecting rod.

Inserting the Cotter Pins.

When the cap bolts are put in place, care is taken to have the cotter holes all point in the same direction, usually lengthwise with the crankshaft, then there is no time lost in looking for the holes when screwing the nuts into position with the holes uncovered. A standing rule with auto workers is to "Always note the direction of a cotter hole before applying the nut," then no time will be lost in leaving the nut at exactly the right angle. In the matter of crank cap bolts, the direction is fixed as above stated, therefore the nuts can always be squared with the length of crankshaft.

The workman struck the nuts a couple of light blows each, also tapped the caps back and forth lengthwise of the shaft before finally squaring the nut for the cotter. Then he selected pins enough for one cap and cut them to length with the wire-cutting pliers, tapped the cotters into place with the pliers, then bent the ends around with the same pliers, leaving the pins smoothly hammered into place with no ends sticking out to scratch fingers when feeling around in the crankcase.

Each of the pistons was put in place as described above, the rings put in place and the bearings, caps and bolts adjusted and the workman never removed the nuts but twice for each piston. If the first trial showed a loose bearing, the second trial showed a tight one, and vice versa, enabling the worker in either case to "pull a fit" without making but two trials, thus doing the work with a minimum time expenditure and obtaining a good fit quickly on each pison rod connection.

Duplicating Garage Tools.

Here is a very good example of the necessity for having plenty of tools in a garage, especially of the ordinary tools commonly used on nearly every car. The writer saw a man come from the far side of the garage, where he was working on a car, and hunt around the station of the man who was setting up the connecting rod bearings on the crankshaft.

Finally the searcher dug a pinch bar out from under

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some of the car parts and carried the bar away to where he was at work. Soon another man came from still another part of the shop and began looking around on the floor. "Wot yer lookin' for, Bob?" "Pinch bar!" "Tom just came for it," said the man who was making up the crank bearings, and away went the third man seeking the pinch bar.

This is wrong. There should be pinch bars enough in the shop that each man could have one when he needs it without having to hunt the shop over for the tool. The amount of time spent each month, by each one of the men, would prove surprisingly large, could all that time be recorded and placed before you in a lump. And still more surprising would it be to you if you could see recorded the reason why each bit of time was thus lost.

Keep your eye on this matter a bit and you will very quickly, now your attention has been called to the matter, see that it will pay you to duplicate, triplicate and even quadruple some of the common tools in the shop tools, and that with only one each of the commonly used tools the men lose time enough to quickly pay more than the cost of supplying a number of duplicates of the tools so commonly used by all the men.

"Here, Sam; run to the drug store and get a nickel's worth of Fuller's earth," said the garage foreman to one of the workmen. "I haven't got a bit in the shop. Always intend to keep some for it is mighty good for brakes. A nickel's worth will last a long time and many a brake trouble can be cured by putting in a little Fuller's earth. It's no good on leather, but it sure works well where there is no leather surface."

Nuts in a Cigar Box.

"When I remove nuts from bolts in taking down an automobile," said a garage worker, "I always make it a practice to put the nuts in a cigar box, divided as in Fig. 2. You can put the other parts in a larger box or spread them around on floor or bench, but I don't like nuts dumped into a box with the smaller parts of mechanism, where you have to hunt for the particular nut wanted.

"It is a nuisance to put each nut back on the bolt where it belongs as a whole lot of time is lost in doing that stunt. Besides, there are often cases where nuts cannot be put back in place without being in the way of other operations. But with all the nuts in a little old cigar box I can quickly select the nut needed without losing any time in hunting over a lot of other junk. Yes, I know that a cigar box soon goes to pieces but they cost nothing and a supply can always be on hand for the bringing home. I like the cigar box for nuts, better even than the tin boxes which some garage men provide—and try to keep for holding loose nuts which have been removed from a machine."

A Lesson in Floor Sweeping.

Boys are having their innings in garages nowadays and it is no strange sight to see ten-year-old boys working around a garage during vacation time or after school hours, especially when "one session" is the rule in their school. One boy got a lesson in floor sweeping which should redound to his credit. The garage owner had provided, instead of brooms, short-fiber bristle brushes with handles attached in such a manner that the brush should be pushed along the floor, driving the dirt before the brush.

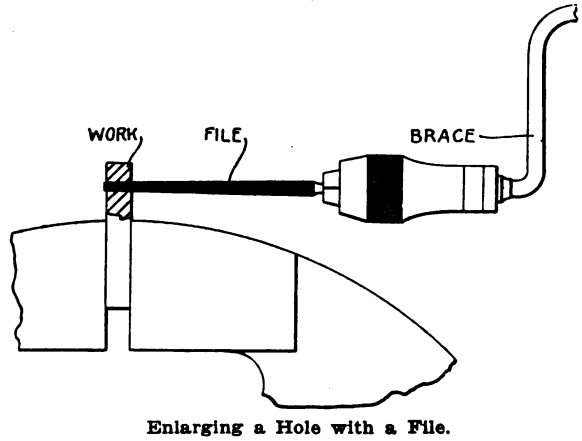
With use the short bristles became bent over and the boy was seen to be pulling the brush as though it was a hoe. The owner soon relieved the boy and made the brush work well again even though the bristles had been bent over. He bored a hole for the handle from the other side of the brush so the boy could still push the brush before him, but the head of the brush having been reversed, the fibers again pushed the dirt before them, instead of sliding over it as they did when they worked with the bend of the fiber instead of against it.

"Cheaper than brooms," the garage man told the writer, and the brushes, which were about 20 inches long, did, it was claimed, much faster and better work than could be accomplished with brooms, and furthermore prevented that "fanning" of the dirt and dust which is so frequently the practice of the inexperienced sweeper, and which is sometimes done by those who well know that dirt "should be drawn but never pushed or flirted into the air!"

REAMING WITH A ROUND FILE.

By CHAS. E. DURYEA.

TRYING to enlarge a hole with the point of a round file is often annoying, since the file wedges if pushed in too far and comes out if the strokes are not annoyingly short. If a bit brace is at hand, as illustrated, grip the file tang with it and use like a left-hand reamer. Do not force too hard, since this is likely to break the teeth. Remove frequently to drop out the chips, as files have but little clearance. The file feeds in if turned to the right and sticks and breaks.



Enlarging a Hole with a File.



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ACCORDING to the report of the National Highways Protective Association, the death toll of automobiles for November, 1918, is far above the total for the same month last year. In New York State alone, 131 persons were killed by automobiles this year, as against only 81 during November, 1917.

It is time for us to ask ourselves why the accidents continue to increase in number. We cannot answer by saying that the increase is due to the increased number of cars in use, for the statement would be untrue. The number of cars owned in 1918 was not 100 per cent more than those owned in 1917. Something is wrong, either with the operators or with the laws.

If we analyze the causes for the various accidents, in at least 90 per cent of the cases, we find that carelessness can be blamed. Obviously it is impossible for the officers of the law to be stationed at every crossroad in the country, and upon every street. The autoist himself is the person who should be dependable enough and not need a guardian.

Taken as a body, the automobile drivers in this country should be able to control their lawless members. It is a case of being their brothers' keeper. The automobilist who knows that his neighbor is a careless driver should take it upon himself to interview that neighbor and see that the neighbor is controlled. It may be the means of saving his own life or the lives of those in his family. It's up to every reader to do his part in controlling the careless ones of the country.

Girl Mortally Hurt: A 14 year old girl of Freehold, New Jersey, a short time ago received internal injuries and a number of bad fractures which may result in her death, when she was run over by an automobile. The girl was scrambling up a bank by the roadside when the car ran her down. Evidently the driver was "green," and, in trying to avoid her, steered his machine up the bank and over her.

Careless on Corner: At Newark, N. J., early last week, a peculiar accident occurred. A taxicab was being driven at a rather slow rate along the street when the driver suddenly decided to turn sharply to the left into an intersecting street. At that moment the driver of a machine behind him tried to pass. However, the taxicab swerved so sharply that the rear car collided with it. Both machines were overturned and badly wrecked. The driver of the car in the rear was killed. This was a case where the taxicab driver should have held out his hand to warn the machine in the rear.

Engine Left Running: The driver of a truck owned by a large department store of Brooklyn left his seat to deliver goods, and failed to stop the engine. A boy climbed to the seat, engaged the clutch, and the truck started, throwing the boy beneath the wheels. The driver came out of the house just as the boy fell, and ran some distance before he was able to overtake and stop the truck.

Driver Hits Two: A young man who had just been served with a summons for speeding his father's automobile, badly injured two people in Brooklyn early this month. This driver did not even hold an automobile driver's license.

Driving on Wrong Side of the Street: An automobile being driven at 40 miles an hour on the wrong side of the street struck five sisters of Chicago, killed one and badly injured the others. The occupants of the car abandoned their machine and ran away, but were arrested later. It is claimed that all of the occupants were under the influence of liquor.

Youthful Driver Kills Child: A sixteen year old chauffeur of St. Paul drove his machine upon the sidewalk and pinned a little girl against the wall of a building. It is claimed that the driver had been driving his car recklessly, had hit a number of other cars, and evidently lost control of his own machine when the accident occurred.

Car Skids and Hurts Seven: A short time ago, a heavy car, operated at excessive speed, while making a turn, skidded on the wet pavement of a New York street and crashed into a crowd of men and women on a sidewalk. Two of the people suffered fractures of the skull and are not expected to recover.

Bled to Death: A prominent business man of New York recently died from a very peculiar automobile accident. The car in which he was riding was damaged in a collision, and fragments of the broken windshield cut the victim's face, as well as some of the other occupants of the car. The victim did not realize that he was badly injured, but his chauffeur noted that what appeared to be a superficial cut on his neck was bleeding profusely. Upon noting this, he drove to the nearest police station, where it was found that his jugular vein had been cut. The flow of blood could not be stopped, and he died shortly after his arrival at the station house.

Sometimes the Worm Turns: This heading appeared in a Pittsburg paper, and the article beneath tells of a case where an Italian was arraigned charged with reckless driving—not an automobile, but a horse and wagon, which had crashed into an automobile.

Motor Truck Causes Flood: A motor truck in Philadelphia, a short time ago, was the cause of a miniature flood on Second and Market Streets. The machine was driven into a fire hydrant, breaking it off and flooding both the street and the cellar of a cigar dealer with water.

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Practical Repair Shop Equipment

If the Garageman Is Not Careful When Purchasing Tools, He Will Find That He Owns a Few "White Elephants."

BY F. L. ALLEN

NOT long ago a friend of mine decided that he would start a small garage and repair shop, and came to me for advice. As far as I could find out, this friend was limited in most everything but nerve. He didn't know much about equipment, he didn't have much money, and though he knew but little about automobiles, he had located an excellent mechanic.

As I said, this friend had plenty of the essential nerve,

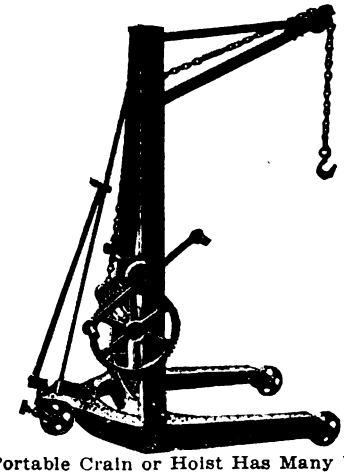


"I'd Surely Have a Set of Socket Wrenches."

and that being the case, he decided that all he wanted was the machinery. So it was that he asked my opinion as to equipment, and thinking perhaps the same advice might come in handy for others, I venture to set it forth in an article.

I once visited a garage which boasted as equipment two hammers and a set of socket wrenches, reinforced by three screwdrivers and a crowbar. Work that could not be done with a hammer would yield beneath the crowbar. If I remember correctly, I think the man in charge possessed a jack-knife as well.

He could always obtain work, provided he could but-



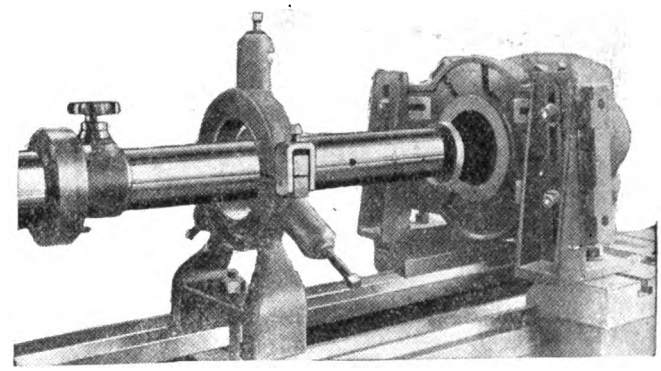
A Portable Crain or Hoist Has Many Uses.

tonhole the repairee and switch him into the office; but he couldn't always keep a steady customer.

This repair man represented one extreme. Later I made a tour of a service station where one could find everything from a cotter-pin puller to an electric hoist. Perhaps the men in the second shop could do better and more work than those in the first, but they nearly ruined my new machine, and so I am in doubt. One of the workmen made the following remark to me which effectually disposes of the overequipped shop as a practical thing:

"They've got whirligigs for twisting the nuts up quick; wrenches for reaching the hidden nuts in an inverted, double-jointed combination L, T, and I-head motor; big presses for flywheels; small presses for magneto shafts; offset, underset, overset, and all kinds of set screwdrivers and bolt removers; but I'll be derned if can ever find a monkeywrench or hammer when I want it."

If I were equipping a garage, I'm sure I would try to steer a path just between the two extremes. The first thing I would buy would be a good set of socket wrenches: one of those sets that have a ratchet handle and universal joint attachment with an extension bar. With such a set in my overalls pocket I could guarantee



A Cylinder Grinder Is Almost a Necessity.

that my customers wouldn't kick because I had destroyed every blamed nut on their machine. But, believe me! I'd keep that set in my pocket or under lock and key if I had many visitors, or I'd be afraid that they would develop legs and walk away.

There are many repairmen that don't need to buy jacks, hammers, cold-chisels and such small tools, especially if the cars which they repair are fully equipped with tool kits. Still I would suggest that such tools be purchased, they're mighty handy in some cases. I don't want to go into the small tools equipment, it will take too much space; such tools can usually be purchased "round the corner" in the hardware shop when they are found necessary.

Next I would look around for a small lathe. I wouldn't care for one so large that it would fill the shop, but buy one that could be used for screw-cutting and general repair work. Any machine that would take in a diameter of 14 inches would suit, especially if there was a

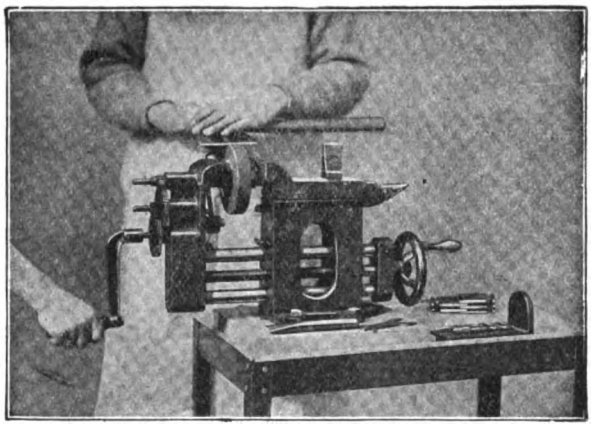
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machine shop in town to which I could take extra large work. I would want a lathe of the hollow spindle type, if I could afford it, and able to turn a shaft at least four feet in length.

In my mind, a screw-cutting lathe is the most important tool in a shop, and I'll tell you why I know this. On a lathe an ordinary machinist can do any job from splining and turning shafts to gear cutting. As time goes on, a garageman who owns one of these lathes can add to his equipment by purchasing different attachments for milling, splining, gear-cutting or tapping.

On this lathe one could grind or bore cylinders as well. Still, if much grinding or cylinder boring is to be done, a special machine for such work should be purchased.

Of course the lathe and other tools would have to be driven by an engine or motor. I would suggest an electric motor for this purpose and one that is about two times larger than I needed at first; that is, if I bought



The More Adaptable the Vise the Better the Investment.

it outright. If I hired a motor, of course I wouldn't get one too large for present demands.

As soon as one begins to make money, one can find ways for spending it. There are many power-driven machines for saving time, and if my motor were not large enough to take care of more machines than the lathe, it would be a dead investment. Always leave room for growth and plan upon plenty of power; you'll need it.

No repair shop is complete without a grinder, but, for goodness' sake, don't mount the grinding wheel on the lathe. I did that little trick once and nearly ruined the machine: the emery gets into everything and sooner or later the lathe is almost valueless. Mount the grinding wheel, or wheels, in the opposite corner of the shop, away from the lathe, but near a window.

With the grinding wheel outfit I would get one of those patented attachments for sharpening twist drills, then I could resurface valves, if necessary, simply by making a thimble or sleeve for the valve stem that would fit the drill-grinding jig.

If I couldn't afford the grinder, and had to make one myself, I should purchase a valve-grinding tool. I would also buy a valve reseating machine; it would pay for itself in a short time.

I should expect to do a lot of bearing reaming and replacement, and consequently would get a set of adjustable reamers. One adjustable reamer is so flexible that it



A Chain Drill Is Mighty Handy.

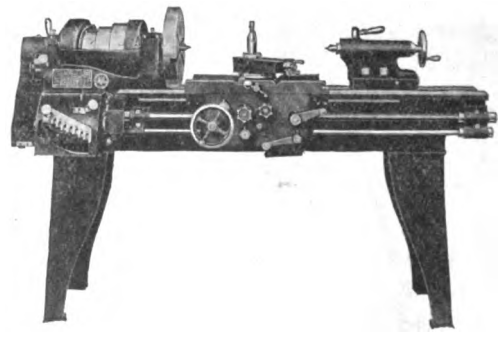
could be used for many sizes of holes and therefore would be worth four or five ordinary straight reamers.

If my capital warranted and I were sure of lots of main bearing repair work, I would purchase a main bearing reamer—one of the kind that will ream all of the main and connecting-rod bearings at one time. With such a tool an ordinary mechanic can do a job in an hour that would take an expert half a day to accomplish by the old scraping method.

Next to bearing repairs, an engine usually requires regrinding. The cylinders, with present-day fuel, seem to work out of shape very quickly. Therefore I am sure that a cylinder grinding or reboring machine would be the next tool to consider.

There are two tools that I would find it hard to choose between: a portable engine stand, and an arbor press. Both of them seem so necessary that I'm afraid I would be tempted to buy them both, even if I had to mortgage the shop. A mechanic can't do good work while he is standing on his head, therefore an engine stand would insure a saving of time. A sledgehammer is a mighty poor tool for driving off flywheels, and so I would buy a press.

For a while I suppose I would buy the babbitt bearings from the service station, or the manufacturer; but I doubt if I would be content at losing the profit. Sooner



First Buy a Screw-Cutting Lathe.

or later I would learn to pour the bearings myself, but I would practice on my own machine before I made bearings for my customers.

One of the tools that I have found most indispensable is a portable drill or chain drill. When one puts a car

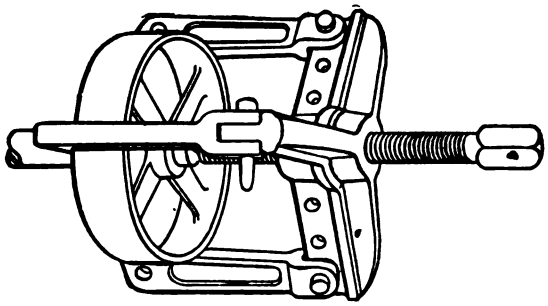
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together again, one invariably finds that a hole must be bored in the frame of the car. One can use a brace and bit for the job, but I prefer to reduce weight by going on a diet, rather than by sweating it off.

In regard to such a portable drill, I know of a flexible shaft arrangement that can be fitted with a drill, an emery wheel or a buffer, and I would send for it post-haste, for it could be used for so many little jobs in the garage.

At this point I find, upon adding up the total, that I have spent all of my friend's money; perhaps you, too, are at the end of your resources; if not, let's keep on spending.

In many cities the fire insurance laws prohibit the building of garages with pits, and the repair man is obliged to lie on his back beneath the car while making repairs. If I did not have a pit in my garage I would purchase a movable crane; then I could lift the front or back of a machine, lift out an engine, or a transmission, and not require the help of half a dozen husky workmen to do the lifting. I would see that the crane was fitted



"A Hundred Percent Better Than a Hammer for Pulling Gears and Wheels."

with roller casters so that an engine or power plant could be carried in it to any part of the shop.

With sufficient money at my disposal I would purchase a drill press, or upright drill—a tool that would make me independent of any outside machine work, providing my lathe were big enough. Milling and special attachments that I could not use on my lathe, I could use on the drill, and so I would feel that my equipment could take care of any or all automobile jobs that might come into the shop.

THE EMPTY SLEEVE.

There were five of us in the smoking compartment of a train en route from Washington to New York. Two were soldiers who, it developed, had recently come from overseas. As we slowed up at Wilmington the blare of a brass band playing a patriotic air came from in front of the shipbuilding plant on the immediate river front. One of the civilian passengers joined the soldiers at the window.

"That's the way to do it," he said with enthusiasm. "See that great crowd of workmen. Those are the boys who made possible the winning of the war."

The soldiers glanced contemplatively at the crowd but made no comment.

The other civilian, an elderly man with the appearance of a merchant, or possibly a lawyer, asked mildly:

"What is the present wage scale for expert workmen, I wonder? I think I read in this morning's paper that some men somewhere were striking for an increase to a dollar an hour with overtime above eight hours."

The soldier nearest the window turned.

"I read that too, sir," he said respectfully, "and it's hard to believe. We got a dollar a day over there, and all the shells the huns wanted to fire at us. This talk about big money in the factories here and the men laying down for more didn't listen good to us, eh, Jack?"

The other soldier nodded.

"I wonder what the boys in the plant over Easton way are going to say to me when I get back on the job?" he replied, shifting his position.

It was then we noticed that his left sleeve was empty. —From Industry.

FROM ONE OF OUR BOYS IN FRANCE.

One of the boys in our office, Lawrence E. Ross, who was with us for several years, has been in France and is connected with the 309th Heavy Field Artillery. In a letter which we received recently, evidently written before the armistice was declared, he writes:

"Just a few lines to say that I am enjoying the best of health and also enjoying the excitement on the battle front. I am proud to say that I am connected with the first regiment of heavy field artillery that the National Army has turned out.

We surely are raising merry h—ll with the huns, and you can bet that they wish they hadn't started anything with good old Uncle Sam. We have some great air battles, and it was only yesterday, while we were at lunch, that tricky Fritz stole over the lines and tried to nip our observation balloon. Well we surely did welcome him with our machine guns and rifles, and I am glad to state that we brought him down before he reached the balloon. It was surely exciting. We found the aviator was a boy of 18 years of age and he had been shot five times.

He died a few minutes after landing. When we start to give the hun a good shelling he usually sends over a gas attack, but the good gas masks supplied by Uncle Sam protect us from all the gases the hun can send over. It is nothing to have to keep the mask on from five to eight hours at a stretch, but when one knows his life is at stake, one hates to take the chance of taking it off even then."

When someone wants to put a Red Cross or Y. M. C. A. war poster in your window, smile and help, instead of frowning and objecting.

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Tractor Experiences In Illinois

Although Still In Process of Development, the Gas Tractor Has Proved Valuable Under Many Conditions

BY ARNOLD P. YERKES and L. M. CHURCH

PROBABLY the most significant difference between the reports received from tractor owners in 1917-18 and those received in 1916 is the much larger percentage of men who report that the tractor has proved a profitable investment. In 1916 less than 80 per cent. while in 1917-18, 90 per cent., or 9 out of 10 men, made such reports. This is partly due to improvements in the tractor, and partly, of course, to the increased prices commanded by both farm products and farm labor during the past year. In this connection, however, it should also be noted that while at the beginning of 1916 a considerable number of the large old-model tractors were still in use, by the end of 1917 practically all of these had been discarded, and the reports on which this summary are based deal almost without exception with the small or medium-sized tractors developed during the last three or four years, which not only cost less in the first place, but give every indication of having a longer life and lower repair charges than the older models.

Another significant difference between 1918 and 1916 is the increase in the percentage of three-plow outfits and the decrease in the percentage of two-plow outfits in use, which is in keeping with the opinions of tractor owners set forth in Farmers' Bulletin 719, to the effect that the two-plow outfit is not large enough for the average corn-belt farm, and that the three-plow or four-plow machines are better adapted to conditions in Illinois.

Nearly three-fourths of all the tractors in Illinois on which reports were received in 1917-18 were pulling three plows, while more than three times as many two-plow as four-plow machines were in use.

Size of Farm and Tractor.

Though the introduction of an improved farm machine may be expected to reduce the man labor required for farm operations, thus permitting one man to accomplish more work and so farm more land than with the older methods, a farm business must be of sufficient size to permit the economical use of an improved machine in order to justify the necessary investment. That is, many small farms must either use the old methods or hire a modern outfit, because the small amount of work to be done each year does not warrant owning the machine.

Among the more important facts disclosed by a study of the use of the tractor for farm work are those relating to the increase in the acreage which can be farmed by one man when a tractor is used in connection with horses, over that farmed with horses alone. Approximately one-third of all the Illinois farmers reporting increased the acreage they were farming after purchasing a machine, the percentage of men so doing being slightly higher in the group reporting the tractor profitable. The percentage of the entire number of tractor owners who have enlarged their farms is significant, for whereas there has been a tendency for the size of corn-belt farms to increase in recent years, the increase among farms in general is not nearly as pronounced as in the case of farms on which tractors are used.

It is doubtless as a result of the more general use of the three and four-plow machines, and hence a better acquaintance on the part of farmers with these sizes, that 76 per cent. of all owners reporting recommend the three-plow machines, while 13 per cent. favor the four-plow outfit, and only 11 per cent. advise a two-plow rig, whereas, at the time the data on which Farmers' Bulletin 719 was based were collected (1916), a somewhat greater percentage of owners recommended the four-plow than the three-plow outfit, with 13 per cent. advising the two-plow rig. At present there seems to be no doubt that the three-plow size is the general favorite for corn-belt conditions, whereas the four-plow is more generally preferred than the two-plow size.

Even on farms of comparatively small size the three-plow tractor is recommended by the largest percentage of owners. This, taken with the other facts, seems to indicate that the two-plow tractor does not increase sufficiently the amount of work which one man can do, hence does not posess, except to a slight degree, the greatest advantage of tractors in general, namely, timeliness in performing farm operations through much more rapid work than is possible with horses. Moreover, a two-plow tractor does not ordinarily develop enough power to make it suitable for operating grain separators and ensilage cutters, tasks for which power is required on the average corn-belt farm. It happens not infrequently that the owner of a two-plow tractor has to hire an engine with slightly more power to do his belt work, so it is not to be wondered at that in case he were buying another machine he would select one with more power.

The question as to the smallest size of farm on which a tractor can be expected to prove profitable is one often asked and one that has been much discussed. Certainly no more reliable opinion on this point could be obtained than the average of the estimates of a large number of tractor owners. In the opinion of these men, the minimum number of acres on which two. three or four-plow outfits may be expected to prove profitable are 130, 170 and 210 acres, respectively.

Attention is called especially to the fact that these

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figures represent the *smallest* size of farm for which these tractors should be purchased, in the opinion of men who have had experience with them, and not the size on which they can be used most profitably. A farmer who is contemplating the purchase of a tractor and whose farm is smaller than the acreages above given should consider carefully before acting contrary to the opinions of experienced men.

The average sizes of the farms reporting on which two, three or four-plow tractors are in actual use are considerably above the minimum figures given above, being 180, 250 and 300 acres, respectively.

The three and four-plow sizes seem to meet best the tractor requirements of the average farm in Illinois; they enable plowing to be performed much more rapidly than is usual when horses are employed. The man labor is also reduced when using these sizes of tractors, as one man attends to three or four plows at one time, instead of only two, as is ordinarily the case where horses are used. (Where modern self-lifting gang plows are used, one man ordinarily handles the entire outfit in plowing, no matter what size gang is used.) Furthermore, the four-plow size of tractor is generally powerful enough to operate practically all of the machines which are commonly found on the average farm, including the ensilage cutter and the medium-sized grain separator. At the same time it is not so expensive in operation as to prohibit its use for many odd jobs which do not demand a great deal of power.

Cost of Tractor Outfit.

The price which a farmer can afford to pay for a tractor for use on his farm depends upon a number of factors, such as the amount and value of the work which the machine will perform annually, the value of the horses which it will displace, the value of the man labor saved, and the amount of increased returns which reasonably may be expected from its use.

The prices for both tractors and the implements for use with them have been considerably increased during the last two years, owing to the advances in costs of both labor and materials required to produce them. The prices paid for the three sizes most commonly bought during 1917 on the Illinois farms reporting average about $800 for the two-plow, $1,100 for the three-plow and $1,400 for the four-plow machine, while the prices for the plows for use with them average about $115, $165 and $235, respectively. In all cases the prices, of course, varied considerably according to the make and quality of the machines. At the beginning of 1918 there was a further general and substantial increase in prices.

Life of the Tractor.

It is obviously impossible to determine definitely the probable life of the latest model tractors, since none of them has been worn out, but the nearest approximation to the actual figure would unquestionably be the average of the estimates given by a large number of men who had used them for a season or two. Tractor owners were asked for an opinion as to the number of years their own particular machines would give satisfactory service, and also to give an estimate of the average life of farm tractors. The replies to these questions showed a tendency on the part of men who reported the tractor as having been profitable to estimate that their own machines would last somewhat longer than the average machine. On the other hand, men reporting them unprofitable usually gave the probable life of their machines as less than their estimate of the average life of tractors in general. The answers to both questions, however, averaged very nearly the same, being eight and seven and one-half years, respectively.

Of course, these averages cannot be regarded as being absolutely accurate, but certainly they should be as nearly accurate as any figures which could be obtained in any other manner at the present time. As a matter of fact there would probably be a tendency on the part of tractor owners to overestimate somewhat. It is not believed, however, that a prospective purchaser of a tractor should expect for his outfit a longer life than seven and one-half seasons, and he would be on the safe side if he counted on a somewhat shorter period of service when calculating the probable value of a tractor for his work.

Days Used Annually.

The life of a tractor cannot be expressed definitely in terms of years, since the number of years it will last will depend upon the amount of work done each year; that is, the number of days or hours it is used. This varies on different farms, according to size, type and system followed, the average for tractors in Illinois being 45 days per year.

While at first glance this may appear low, when it is remembered that on farms where horses do all the work they are used on an average of only about 100 days annually, it will be seen that where both horses and tractor are used, even though the number of horses is somewhat reduced, the machine need not be expected to have employment for as many days annually as did the horses. The horses kept will still do some of the work, which will, of course, decrease the amount to be done by the tractor. A considerable percentage of the 100 days' work done by horses represents odd jobs for which the tractor cannot be used to advantage. Even if the machine were to do all the work formerly done by the horses it would not normally be employed 100 days per year, inasmuch as it does the work more rapidly.

Practically all farm operations must be carried on within limited periods, and between these seasons there will often be no field work that the tractor can do, either on the home farm or for neighbors. The fact that weather and soil conditions are such as to permit field work with a tractor does not necessarily mean that there is such work to be done. Farm management plays an

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important part in organizing the farm so as to provide profitable employment for the tractor during as many days as possible. Such organization involves the planning of a crop rotation which will furnish a large amount of work which it can do, the elimination of as many horses as desirable, and the distribution of the work over a long period. However, the rotation should include only such crops as can be grown profitably in that particular section.

Expense for Repairs.

Of 140 tractor owners in Illinois who had used their outfits one season or less (average age 9 months), 48 reported that they had spent nothing for repairs. The others had repair bills varying from a few cents to a hundred dollars or more, the average being $22, making the average repairs for the entire group about $15. Comparatively few machines go through their second season without repair charges. The average repairs for 158 Illinois outfits between the ages of 13 and 24 months (average age 20 months) was $39. For 34 machines between the ages of 25 and 36 months (average age 32 months), the average repairs amounted to $79.

It is impossible at present to state definitely just what effect the size of tractor has upon the repair bills. The figures thus far obtained would seem to indicate that the percentage of the first cost required annually for repairs is somewhat lower for the four-plow size than for the smaller outfits, but this may be due to the fact that there are more cheaply constructed and low-priced outfits among the smaller sizes than among the four-plow machines. It is impossible as yet to make any definite statement as to the annual repairs required by high-priced machines as compared with lower-priced ones of the same capacity. The figures seem to indicate that repairs are somewhat lower for the high-priced machines, but there is not enough difference to justify a positive statement to this effect.

The figures given would indicate an annual repair charge during the first three years of a tractor's life of about 3 per cent. of the first cost, but this would undoubtedly increase during the latter years of its life, as is the case with most other machines. It would not seem safe to expect the cost of repairs for a tractor to average less than that for other farm machines, which is a little over 4 per cent., and it is not improbable that it will amount to slightly more than this. In figuring the repair costs to be charged against each day of use or acre plowed, the average annual charge has been taken as 4 per cent. of the first cost.

Plowing Done Per Day.

The number of acres covered per day by a plow drawn by a tractor is usually slightly greater than that covered by the same sized horse-drawn plow. The acreage covered by two different machines, each pulling the same number of plow bottoms, often varies considerably, because they travel at different speeds, are in different kinds of soil and plowing different lengths of furrows. Theoretically a 14-inch plow when drawn by a tractor should cover about 3 acres in an ordinary working day of 10 hours, as the average plowing speed is slightly more than 2 miles per hour. This will hold true in actual practice when the plowing conditions are favorable, provided the outfit does not give trouble. That is, a two-plow machine should plow 6 acres and a ten-plow outfit 30 acres per day, provided both travel at the average rate of speed and are kept moving. However, where trash is to be turned under which frequently clogs the plows, each plow drawn by a large tractor will cover much less ground in a day than one drawn by a small outfit, since the delays will naturally be in proportion to the number of plows pulled. A delay on account of one plow on a two-plow outfit stops only one other plow, while on a ten-plow rig, for example, it stops nine other plows.

In view of these facts it is apparent that when plowing under unfavorable conditions large gang plows do not cover as much ground per day per plow as the smaller ones. However, one man accomplishes considerably more work with the large outfits, even under such conditions.

According to the figures furnished by tractor owners in Illinois the area covered per day (10 net working hours) in plowing with the tractors most commonly used is 6½, 8¾ and 10 acres for the two, three and four-plow outfits, respectively. These figures for the two-plow and four-plow outfits correspond closely with the averages shown in Farmers' Bulletin 719 for the same sizes of tractor, while the average acreage covered by the three-plow rigs shows an increase of one-half acre per day. This is doubtless due to the placing on the market of a large number of three-plow outfits of slightly greater power, and therefore larger capacity per day, than the three-plow machines in use when the data for Farmers' Bulletin 719 were obtained.

Many tractor owners require their outfits to pull one more plow than they are rated to handle. Under such a load the outfit does not cover as much ground as would be covered by a machine built to pull that number of plows. Three plows behind a two-plow tractor will cover only a little more ground, as a rule, than will the two-plows, because the tractor usually will travel a little more slowly, partly because the engine is overloaded and does not maintain its proper speed, and partly because the drive-wheels will slip more than usual with a load heavier than the machine was designed to pull. As a consequence delays on account of small holes or slight grades will be more common, as will also mechanical difficulties.

The reports of a number of men who were thus overloading their machines were tabulated and compared with the results obtained by other men who owned the

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same make and size of tractor, but who were requiring their machines to pull only their normal loads. This comparison showed that the repairs on the overloaded tractors were considerably higher, more time was lost per day with these outfits, and the estimated life of the overloaded tractors was considerably less than for the machines pulling normal loads. At the same time the increase in ground plowed amounted to only about 1¼ acres per day; that is, the additional plow covered about one-half as much ground in a day as did each of the two plows which constituted a normal load. The gasoline consumption per acre averaged somewhat lower for the overloaded machines, as would naturally be expected, since the tractor would not have to travel so far to plow an acre. However, the depth plowed was not so great, and it is reasonable to suppose that the plowing conditions were generally favorable or the third plow would not have been tried. The increased acreage per day and the slight saving in fuel together would not offset the increased repairs and the value of the time wasted from trouble with the outfit. Overloading a tractor is inexcusable save in exceptional cases where speed in completing a job is of the utmost importance. If such speed is required regularly the work could be done more cheaply and satisfactorily with a larger outfit.

The acreage covered per day at field operations other than plowing will vary, of course, with the width of the implement pulled, and this in turn will depend upon the relative draft. It is therefore impossible to give for such operations average figures which would be of value. In harrowing or disking, for example, the width of the implement pulled will depend upon the adjustment of the disks or harrow teeth and the depth of the ground being worked. The nature of the soil will also have an influence. The speed of the tractor ordinarily will not be quite as great in soft ground as where the machine has a firm footing, because of the greater slippage of the wheels. On the whole, not so much time is lost on account of clogging or other obstructions when harrowing and disking as when plowing.

*Reprint of an Article appearing in The Journal of the Society of Automobile Engineers for October, 1918.

(To be continued.)

A HANDY GARAGE LIGHT.

The Workbench and Vise Should Be Well Lighted or the Mechanic Cannot De Good Work.

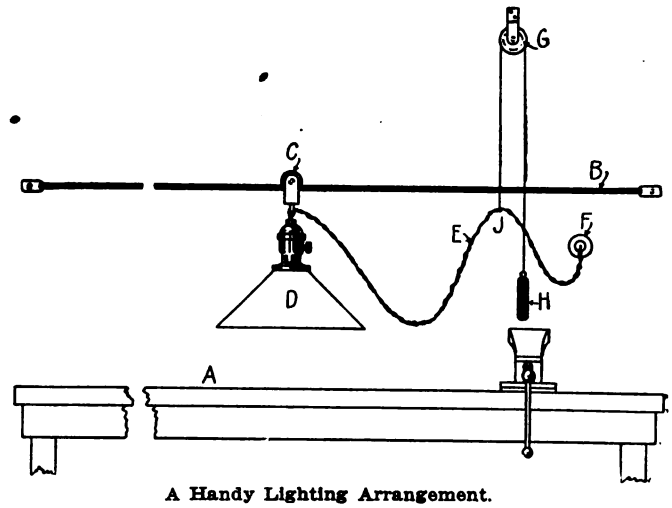
A FEW days ago as I was passing through a repair shop, I was attracted by the peculiar antics of one of the workmen. He was dancing up and down and occasionally he would wave one hand in the air; he wasn't doing this quietly by any means, but was filling the air with a sulphurous string of words that hardly look well in print.

So interested was I that I stopped to watch. After quieting down, Kelly, for that was his name, snatched rapidly at something on the workbench, and again went through the same performance. There was nothing offensive looking on the bench, and I certainly was curious as to the reason.

Kelly went through the same trials for a third time, then crawled beneath the workbench and in a minute backed out again; then he went to work as though nothing had happened.

What happened to Kelly? was the question that kept running through my mind, and finally I returned to him and put the question to him directly. He acted rather "sheepish" for a minute or so, then solved the problem. "Nothing but a bare light wire," he said. "The thing fell across one of those wrenches, just the one I wanted, and I didn't want to crawl down beneath the bench to turn off the current."

There you have the reason for many minutes of lost time, doubtless the same trouble exists in many repair shops. The flexible lamp cord gets into the oil and grease and sooner or later the insulation is worn off. If a fuse doesn't burn out, the wire will give every workman "nerves" if he don't watch out.



A Handy Lighting Arrangement.

Keep the wire out of grease and away from the bench in the manner illustrated. On the wall back of the bench screw a long, round bar, B, and upon it mount a pulley block, C, which is soldered to a light socket and shade, D. Cut the flexible cord just long enough so that the light can be carried to the end of the bar B, attach it to its plug in the wall, F, and overhead place a second pulley block, G.

About midway between the light and the socket, on the cord, tie a length of string, carry it over the pulley G and hang a weight to it as at H.

You see that the device answers two purposes. It preserves the light wire and it sheds light to any part of the workbench, just where the mechanic needs it.

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A Happy, Prosperous and Glorious New Year to All Our Friends.

THE holiday season of peace and cheer has once more arrived, and we take this opportunity of extending our best wishes for a prosperous and glorious future to all of our readers. It is the time for new resolutions, and a time for cordiality and friendship.

We doubt if there is any other paper which has as many friends as our magazine. True, there are many that have a larger list of subscribers, but in our case, we feel that all of you who read are a part of our big family. Like you, we have gone through months of trouble, and like you, we rejoice in the peace that is before us; peace which is mingled with prosperity, and we heartily assure you that our prosperity will mean a bigger, and more valuable magazine for you.

We have great plans for the coming year. We expect to publish a magazine that will be second to none, in our field; a magazine so valuable to our readers that during the year 1919, death will be the only excuse for the cancellation of a subscription. When we read over the magazines which we have issued during the present year, we are possessed with a feeling of pride, which is reflected by the letters we receive from the subscribers.

We feel safe in saying that we have furnished 100 per cent practical articles for our readers. We feel amply repaid for the time we have spent in selecting articles, but we also feel that there is a great chance for improvement.

Conditions for the past year have been adverse; we have been limited as to the paper, as to the number of pages, and tied down by the high postage rates. We are optimistic as to the future, however, and can safely promise that our subscribers will receive one hundred times the value of their subscription price during the coming year.

Our Flag Has Its Place in Everyone's Heart, Let Us Keep It There.

HIGH above our heads floats the symbol of Liberty, the American flag. Throughout the world our flag stands for Victory and Democracy. We must not feel that we won the war. America only helped to win. What the outcome might have been had America withstood the insults of the hun, can never be known.

Suffice it that it was through the efforts of our brave boys that the war was ended. The attention of the other nations of the earth, in addition to those with whom we were allied, has been called to us. Our flag to them is the symbol for Liberty and Justice. Even our enemies have turned toward us for salvation, and so for the first time in the history of the world, one flag has a singular place in the home of every person on the earth. The flag which stands for America can well be termed as America's trademark. Let us not permit the other nations on the earth to forget America.

In South America we have a land of golden opportunities, a country that is craving for many products, and we can satisfy that craving. In Canada we also have many wonderful opportunities. Undoubtedly we shall be called upon to furnish Europe with many products as well. If we care to compete with foreign products, and undoubtedly there will be great competition, we must study our market well, and be sure to furnish goods that are acceptable to our purchasers.

Every mistake that we make means lost prestige, and if our manufacturers make very many mistakes, we lose the trade altogether to some foreign country more enterprising than ourselves.

Good Times Ahead.

According to Judge Gary, Chairman of the United States Steel Corporation, the outlook for business, now that the war is over, is very reassuring. Judge Gary is a clear-headed business man and has exceptional opportunities for sizing up the situation as to business throughout the country. Among other things, he recently said:

"The United States is the richest of all countries. It possesses one-third or more of the total wealth of the world. It has become the leader of finance, and in this respect may properly exercise a commanding influence. Its natural resources are immense and are susceptible

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of increasing development. If industry is protected and fostered in accordance with its merit the war burdens surely, even though gradually, will be lifted. We shall be a creditor nation with a large interest income, more virile, more progressive, more successful, wiser, and better, than ever before."

Everybody knows, of course, that this country has not been making large quantities of goods for general consumption, but that its manufacturers have very largely been engaged in making war materials of various kinds. Now that there is no occasion for the manufacture of munitions or war materials, manufacturers can go back to the making of regular goods. Business of all kinds has been hampered for the past year by a lack of raw materials of all kinds.

Of course, there is likely to be a considerable readjustment in the matter of wages, before things settle down. Men who have been getting $10, $15 and $20 a day or more in munition plants, naturally must not expect any such wages from legitimate business. They will have to get back to old conditions again.

It is well known that nearly all building operations have been suspended, for one reason, because builders could not get the necessary steel so far as buildings in large cities are concerned and in the country districts building material has gone up to prohibitive prices, and furthermore, there was a scarcity of labor at prices which builders could afford to pay.

Business in this line is likely to be resumed very slowly because dealers in material will keep prices up as long as they can and the workmen will keep wages up as long as they can, probably. It is quite plain that building operations of all kinds must be restricted until there is a considerable drop in the cost of materials and wages.

Tremendous Traffic Increases Call for Greater Transportation Facilities.

WITH the ending of the war comes a problem of great importance, the need for better transportation facilities. It is true that our railways and waterways will be opened for commerce and be able to take care of raw and finished products to a greater extent than during the war. There are many people who consider that the increased facilities will take care of all of the products which are turned out by our manufacturing plants.

We realize, however, that America is able to put out nearly 100 per cent more products than she was in 1914. Even at that time our railroads were congested. Therefore it stands to reason that with this tremendous increase our railroads will be swamped.

The answer to our problem is had in two words, MOTOR TRUCKS. Those of us who live in the cities have begun to realize that a large portion of inter-city and even inter-state traffic can be taken care of by trucks at a lower cost than by freight. The necessity for handling is reduced to a minimum. Short hauls can be made at a tremendous saving, and much time can be saved as well.

There is an enormous demand for motor trucks. Every merchant, manufacturer and farmer is investigating the possibilities to be had in these machines. The dealer in trucks is sure to reap a golden harvest in the next two years. Therefore, get into the game.

According to the Law of Supply and Demand, Prices Must Drop Very Shortly.

THE theory that present steel prices, or prices approaching those now prevailing, will be maintained because of the call upon America for steel with which to rebuild Europe, is grossly absurd."

This timely comment upon the present steel situation by the N. Y. Sun contains the matter in a nutshell. We can do no better than to quote various portions of this same editorial which was written by one who evidently knows conditions. The "Sun" goes on to say that "it would not be unwarranted exaggeration to say that during the entire war there has not been as much steel destroyed in wrecked buildings as is contained in the Woolworth Building alone. The reason for this is that the buildings of devastated France were practically all constructed of brick and stone. What is true of France, in this respect, is true of Belgium, where the destruction was relatively small as compared with France.

"Neither France or Belgium will break their necks to build destroyed towns in a minute. They will take their time about it. It is their way of doing things. We may as well, therefore, dismiss at once the matter of rebuilding Europe as a price sustainer for American steel and iron. Confined largely to domestic demand when the Government ceases to be a large customer (and this will soon happen) steel mills will find a restricted call for their products at war prices or anything approaching them. It is a question of reasonable prices for steel, and that quickly, or idle steel mills. There is no other solution of the problem and idle steel mills mean low prices for steel and even frequently starvation prices."

The Labor Problem and the Effect of Immigration Upon Our Wage Scale.

ONE of the greatest questions at the present time which affects every individual in the country, is the labor problem. Laboring men call upon capital to pay war wages. Labor calls upon capital to reduce the price of finished products. Labor calls for shorter hours, necessitating less production. At this time we do not want to enter into the discussion of this problem. Time only can help to solve it.

There is one vital fact, however, which concerns this problem, and which merits discussion, and that is immigration. Given the oportunity, our former enemies will

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flock to this country. Our own working men will be forced to compete with them in the fight for positions.

Accustomed as they are to low wages, a normal wage in America will mean a golden opportunity to the foreigner. We must all do our part to discourage this sort of immigration. If we want to keep our positions and obtain the wages which are being obtained to-day, immigration of aliens must be stopped. We are willing to receive with open arms those who have stood with us in the war, but we must frighten away those who have stood against us.

It is the one question that labor and capital can agree upon without any difficulty and it is the most important phase of the whole situation. Because a man has a german or austrian name, however, we must not bar him from our factories. His character must be investigated, and his status determined. If he is an American citizen, he deserves all of the consideration that we give to our own citizens. In America we have a large population of foreign-born germans and austrians who are as loyal to America as the Americans themselves.

We cannot, nor do we want to discriminate against those Americans no matter where they were born, but we must protect their interests as well as our own. We must use all of our influence to prevent a flood of enemies from entering our country and swamping us.

Wonderful Possibilities in the Use of Trailer Cars and Removable Bodies.

A FIELD of the industry which has heretofore been greatly neglected is the sale of trailer cars. Every manufacturer should investigate the possibilities held forth by this unit. One truck or tractor can be used to haul one or more of these trailer cars.

Consider, for instance, the case of one who makes facing brick or tiling. The time taken in loading these bricks upon the wagon is considerable. Each brick must be handled by itself, and unloaded in the same way. With a trailer, it is unnecessary to hold the truck while this work is being done. Trailer car bodies are furnished in many styles and loaded while the truck is transporting a filled body from the point of delivery. At the point of delivery the body is removed, and an empty one put in its place. The empty one is taken back to the factory, while a filled one is substituted.

The truck itself is used simply for haulage purposes, and the time incident to the changing of the bodies is small as compared with the time that would be taken to load the carts. In the case of short hauls such a removable trailer or truck body is a paying proposition. Every manufacturer should investigate the possibilities of units of this sort.

The Dark Cloud, When Turned Inside Out, Proves To Have a Silver Lining.

IT has been said that there is a corresponding benefit derived from every accident, and it is probably this thought that gave rise to the old saying "Every cloud has its silver lining." Unquestionably, the world war has had a remarkable effect upon the automobile field. Up to the year 1916, there was a certain class of car owners who felt that a new automobile every year was a necessity. They felt that the time saved by owning a new machine more than paid the additional cost.

In the face of the decreased production of automobiles, conditions naturally changed. Few men could afford, or in fact were allowed, to purchase new cars, if their old machines were in condition. As a matter of fact, the patriotic car owner did all he could to save his machine, and keep it in condition.

He found that his old car was not a wreck at the end of its second season. Perhaps he is still using this same machine, and knows that it is still as valuable to him as it was when he purchased it. We have learned how to conserve our resources, and therefore how to save perfectly good machinery. It is no longer fashionable to be a waster.

An automobile one or more seasons old has just as much service value if it has been used properly, as a new machine. It still devolves upon us to conserve resources in order that we may not pass along the tremendous war debt to our children.

It is your duty, as a patriotic American, to keep your car in repair, to read, to learn, and to heed the advice of your repairman. We should all do our part toward the building up of American commerce, and bearing in mind the fact that we cannot eat our cake and sell it too, we should save our products in order that we may enrich ourselves as well as further our interests by exporting them to other countries.

What Can Be Done to Utilize Those Factories, Built During the War?

ONE of the biggest problems which confronts the country to-day is the utilization of those factories which heretofore have been engaged exclusively upon ammunition or kindred work. Since the outbreak of the world war, four years ago, the capital investment in manufacturing plants has been nearly doubled. In many cases, whole towns, and even cities, have sprung up over night.

Now that the war is over, however, the need for these great organizations has passed. Shall we, however, let the enormous factories lie idle? Every day of idleness means a direct loss to this country. National wealth depends upon the output of products, and the conservation of national resources. The loss of one of these plants means a direct loss to the community. The burden of taxation falls upon the remaining plants.

Our salvation, therefore, depends upon the utilization of the factories for the production of such commodities as we may be able to use, or export. The automobile industry is capable of absorbing practically all of such plants. However, when we speak of the automobile industry we include machinery manufacturers who dispose of their products to this branch of trade.

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It is to our advantage that we boost America. We must spread the propaganda that American made machinery and American made products are the best in the world. We must stand first in the production of machinery, tools and automobiles. We cannot afford to drop into second place, but must advertise our goods in every corner of the world. Let our slogan be "America first."

AN INTERESTING ITEM.

The annual report of the State Industrial Accident Board of Massachusetts, recenty issued, discloses the curious fact that there have been more fatal accidents in that State for the past year from vehicles drawn by horses than from automobiles. It appears that there were 23 fatal accidents in connection with horse-drawn vehicles, and only 20 by self-propelled vehicles.

Brazing and Soft Soldering

An Article Dealing With a Branch of Repair Work That Is of Interest to Every Reader.

BY JAMES STEELMAN

THE repair of automobile parts calls for the exercise of much skill and judgment. The service the parts have to perform is frequently very severe, so that the repair must often retain a large percentage of the full strength of a new part. The variety of materials used in an automobile also complicates repairs for the double reason that this fact greatly broadens the amount of knowledge that the repair man must have and the the use of diverse metals in co-acting parts often introduces new problems.

Among the metals, with which it is necessary to deal, are cast iron, steel, aluminum, aluminum alloys and copper-zinc alloys. These are perhaps the most important. And the re-union of breaks in parts made of these materials constitutes an important portion of what the automobile repairer has to do.

Three Repair Methods.

There are several methods of effecting such re-unions. These differ in respect to their suitability to the varying job. In fact, if an automobile repair man wants to be really up-to-date, it is necessary for him to understand all the principal varieties of methods of joining metals, so that he may be able to judge which will best suit the job in hand and so that he may have the knowledge of how to apply the method after it has been selected.

The principal methods of uniting metals, so far as automobile repair men are concerned, are three:

(1) Ordinary blacksmith welding;

(2) Gas welding, usually with torches consuming oxygen and acetylene or oxygen and hydrogen;

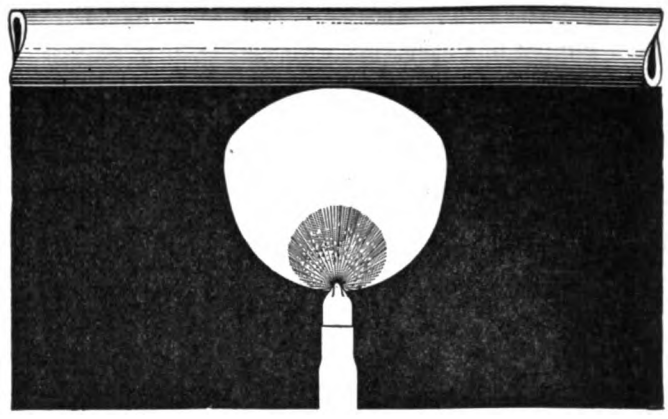
(3) Soldering and brazing.

All have their place. Probably No. 1 is the best of the lot wherever it is possible to apply it in the most approved way. It is limited, however, to one or two materials. The other methods are applicable to a great variety of metals and may be used to join diverse materials.

An important difference, especially for automobiles, between methods Nos. 2 and 3 consists in this: With gas welding, it is usually possible to select for the joining material precisely the same material that is in the work itself; with brazing and soldering, on the other hand, the joint is usually quite different from the work. In the case of many parts about an automobile, this difference between the two methods will play little or no part. In the case of others, however, it may matter a good deal. Where the joint will be exposed in service to the wet, especially in conjunction with anything of an acid character, we are to expect electrolytic action.

Electrical Action in Joints.

This may or may not be important. That is one of the things to judge at the time. Where electrolytic action is to be feared, there brazing or soldering are



Small Work Can Be Preheated Over a Gas Jet.

scarcely applicable, unless the work and the joint are to be practically of the same material. For example, there may be a break at a point where there is continued exposure to the weather. If the joint is made by brazing or soldering with a diverse metal, then everything is ready for electrolytic action to start upon as soon as the presence of moisture, especially moisture more or less acidulated, is realized.

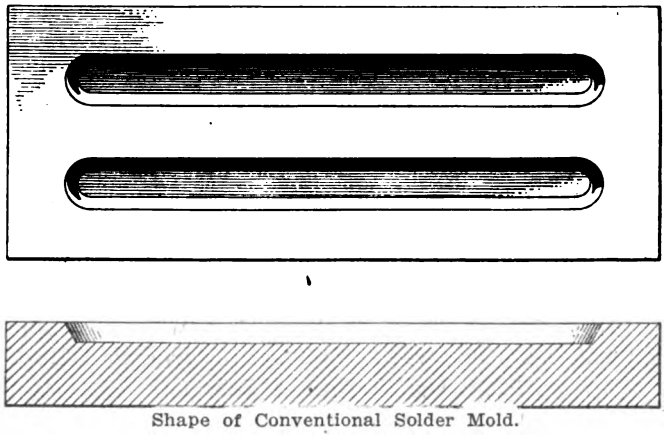
Ordinary dampness mixed with the carbon dioxide in the air may be responsible for a good deal of the electrolytic action that takes place. The result is apt to be a

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breaking down of one of the two metals. The gas welder avoids, or may avoid, this danger by using the same material in the joint as occurs in the work. Sometimes this is reasonably possible with brazing or soldering.

Another difference between methods No. 2 and 3 consists in the fact that No. 2 is probably easier to apply to a part still in place. This I would explain as due to the fact that, with the gas methods, we have often no need to heat the whole job at once. We do the work a little at a time. There are occasions, however, where even with gas welding we need to pre-heat and this may mean practically that we heat the whole job, though not with the torch.

There is one big rule about brazing and some soldering. It is this: The work must be hotter than the braz-



Shape of Conventional Solder Mold.

ing or soldering material, when that material is at its melting point. This means, for one thing, the melting point of the work must be higher than the melting point of the joining material.

Generally speaking, the higher the melting point of a joining material, the stronger it is. This fact tends to create the desire to use joining material that melts at as high a point as the circumstances permit.

Because it is so often better to have a very high melting point for the joining material and because this point must nevertheless be lower, distinctly lower, than the melting point of the work, it is necessary to have a great many varieties of joining materials.

Brass is the chief material used for joining. Innumerable varieties may be made by changing the proportions of copper and zinc. We may vary from all copper and no zinc to all zinc and no copper. These variations give varying melting points. The more zinc, the lower the point. I give herewith a table showing the temperatures for a range of alloys. The curve exhibits these facts and shows also what are presumably the temperatures corresponding to intermediate alloys.

PERCENTAGES IN THE SOLDER

Copper	100	90	80	70	60	50	40	30	20	10	0
Zinc	0	10	20	30	40	50	60	70	80	90	100
Melting Point, F	1983	1904	1823	1706	1652	1616	1508	1436	1292	1076	786

It will be noted that we may get any temperature between 786 and 1983 degrees Fahrenheit. The figures in the table are derived from tables published by the Smithsonian Institute at Washington, D. C. They are to be regarded as having been obtained from samples dealing with metals of a very high grade. The melting points corresponding to low grades of copper and zinc will undoubtedly be lower than with high grades of these materials. This must be borne in mind.

I now give two other tables which enable those interested in soldering to get temperatures that are low.

LEAD-TIN ALLOYS

PERCENTAGES IN THE SOLDER

Lead	100	90	80	70	60	50	40	30	20	10	0
Tin	0	10	20	30	40	50	60	70	80	90	100
Melting Point, F	619	563	529	504	464	428	374	365	392	421	450

LEAD-TIN-BISMUTH ALLOYS

PERCENTAGES IN THE SOLDER

Lead	32.0	25.8	25.0	43.0	33.3	10.7	50.0	35.8	20.0	70.9
Tin	15.5	19.8	15.0	14.0	33.3	23.1	33.0	52.1	60.0	9.1
Bismuth	52.5	54.4	60.0	43.0	33.3	66.2	17.0	12.1	20.0	20.0
Melting Point, F	205	214	257	262	293	298	322	358	360	453

It will be noted, from a comparison of all three tables, that it is possible to get solders corresponding to pretty much all temperatures from 1983 degrees Fahrenheit down to 205 degrees. There is a big gap between 786 and 619 degrees at the transition from brasses (copper-zinc alloys) to lead-tin alloys and small gaps in the lead-tin-bismuth table. For intermediate temperatures of the brasses and lead-tin alloys, the curves supply the data as to the proper mixtures. It is advisable to remember, however, that *ordinary commercial* metals will probably melt some degrees lower. The tabular melting points are accordingly to be regarded as too high.

To test whether a high temperature joining material has a low enough melting point, a convenient method is as follows: Heat the work, or a sample of the same material as hot as it is proposed to heat the work when actual brazing is going on. Put some small bits or grains of the joining material on the hot surface and note whether these bits melt. If they do not melt rather quickly, the joining material is to be regarded as having too high a melting point.

Aluminum is to be soldered by a special solder. There are many of these. I pass along the following 26 recipes which are understood to have been first published collectively by *Machinery*.

SOLDERS FOR ALUMINUM

PART GIVEN IN PERCENTAGES

Tin	Aluminum	Zinc	Copper	Bismuth	Lead	Phosphor tin*	Silver	Antimony	Cadmium	Magnesium
95.00	—	—	—	5.00	—	—	—	—	—	—
78.50	2.00	19.00	—	—	—	0.50	—	—	—	—
—	66 70	—	—	—	—	—	33.30	—	—	—
20.00	70.00	—	—	—	—	—	10.00	—	—	—
97.00	—	—	—	3.00	—	—	—	—	—	—
—	6 00	89.50	4.50	—	—	—	—	—	—	—
71.25	2 25	26.00	—	—	—	0.50	—	—	—	—
60.00	4.00	8.00	4.00	—	12.00	—	12.00	—	—	—
37.50	—	25.00	37.50	—	—	—	—	—	—	—
—	8.00	92.00	—	—	—	—	—	—	—	—
30.00	—	20.00	—	—	—	—	—	—	50.00	—
80 00	2 25	17.00	—	—	—	0.75	—	—	—	—
66 00	15 50	—	—	9.00	—	—	—	7.00	†	2.25
15.50	2 50	78 25	—	—	2.50	1.25	—	—	—	—
—	20.00	65 00	15.00	—	—	—	—	—	—	—
49 05	—	20 31	1.15	—	26.06	—	—	3.43	—	—
30.00	70 00	—	—	—	—	—	—	—	—	—
—	4 00	94 00	2.00	—	—	—	—	—	—	—
85 10	10.80	—	—	—	—	—	—	—	1.35	2.75
60 00	—	15.00	—	5.00	10.00	—	—	5.00	—	‡
86 00	—	—	—	14.00	—	—	—	—	—	—
98 00	1 00	—	—	1.00	—	—	—	—	—	—
20 00	70 00	—	10.00	—	—	—	—	—	—	—
48.00	2 00	27.00	—	—	23.00	—	—	—	—	—
90 00	5.00	—	—	5 00	—	—	—	—	—	—
84.95	—	—	—	15.05	—	—	—	—	—	—

*10% phosphorus.
‡Vanadium 0.25% is to be included.
‡Chromium 5.00% is to be included.

It will be noted upon going over the table that all contain either tin or aluminum and that quite a number

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contain both. It is understood that all 26 of the foregoing aluminum solders have been successfully used.

It will be well now to add the melting points of a number of metals, for we need to know the melting point of the work as well as that of the joining material.

Melting Points of Various Metals.

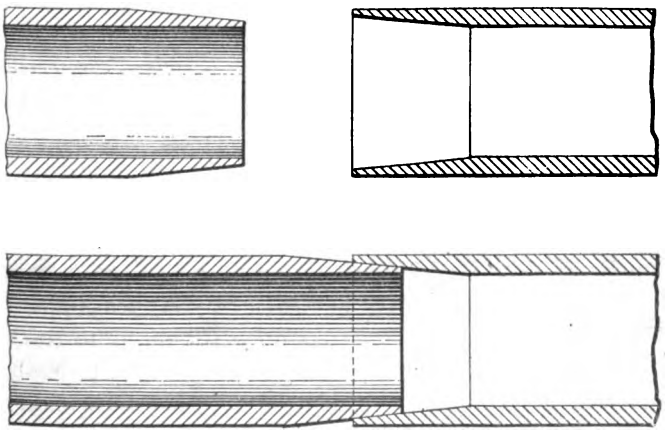
	Degrees F.
Platinum	3230
Wrought iron	3000
Steel	2400 (about)
Cast iron	2000 (about)
Copper	1983
Bronze	1690 (about)
Aluminum	1160
Zinc	786
Lead	620
Tin	445

Soldering and Brazing Operations.

The essential things are but few, although it may sometimes require a lot of trouble to produce some of them. Suppose we have a copper tube to braze onto another one. One of the essentials is that the metal surfaces be clean. But what is clean? What is really required is that nothing but copper shall be at the surface. Often what is there is an oxide of copper.

Clean a piece of copper with an acid, rinse it off with clean water and wipe dry. The metal will be bright. It is clean. Now put the piece over a gas flame and you will soon see the color change to a dull hue. Copper oxide is forming and the cleanness is gone, in so far as brazing is concerned.

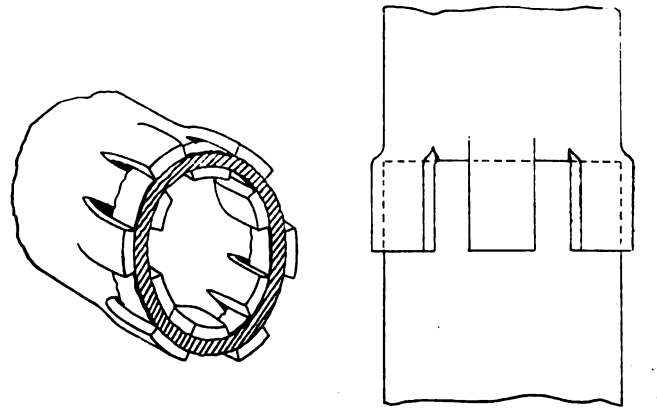
The general procedure of brazing begins with cleaning the surfaces by means of an acid or equivalent. The next step is to apply the hard solder or brass together with the flux. The third and final step is the heating operation. Among the preliminary steps is the placing



Beveling the Tube, Inside and Out, Before Making the Joint.

of the parts. They may be set edge to edge. The process of uniting them may then be called *butt brazing*. If, however, the one part is arranged to overlap the other, we have *lap brazing*. There are in addition, a number of variations in methods. In some work, the article is dipped into the melted brass or solder but this procedure is scarcely suited to repair work for the reason that the variety is too great.

A *muffle* is sometimes used to inclose the work while it is being heated. The muffle performs the useful service of controlling the heat. With it, it is possible to heat pretty evenly and to halt the heating when it is



How Two Thin Tubes Can Be Joined Before Brazing or Soldering.

desired to do so. This is desirable when the work and the solder melt at points not far apart.

Brazing Copper Tubes.

If the copper tubes which are to be united have heavy walls, we may prepare the edges by giving each a long bevel. This beveling is done in such a way that one end may be telescoped into the other. If the material in the pipe is thin, the procedure is different. One method proceeds by cutting slits in one edge. These slits are somewhat out of parallel with the tube axis. When the edge has been slit all around at short intervals, the next step is to bend the tongues of metal between slits alternately in and out. In this way, there is produced a kind of circular groove all around the pipe end. The other end is thinned and then set in the groove. The tongues may then be forced to hug the unslitted end by inserting a wooden core and using a wooden mallet. The work may now be set up in a vertical position.

The cleaning of the surfaces will naturally be done before putting them together. A strong salt-and-water brine will often be sufficiently active to accomplish what is wanted. The copper is then annealed. This is done by heating the copper tube to a cherry red heat and then immersing it in clean and cold water. This is a peculiar result,—steel, it will be remembered, when highly heated and then quenched will become hard and tends to brittleness.

After annealing, the surfaces may be cleaned again. Acid will not necessarily be needed this time. It depends upon what has been done with the work since the acid treatment. Clean water and sand will usually or often be sufficient. A bit of clean cotton waste may be used as a means with which to apply them.

There are different ways of managing the flux and the spelter. In the present case, it is permissible to

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pulverize both and make a half-and-half mixture. By mingling a small amount of clean water with the mixture, it is possible to convert it into a kind of paste, thus making it convenient to use.

Borax is a suitable fluxing material for the job in question. The paste is put round the joint in such position that when heated gravitation will cause the flux and the spelter to flow into the crevices of the joint. A charcoal or other fire is now employed to do the heating. After a time, the borax will melt and form drops. Next, blue fumes will rise from the spelter showing that the spelter is about to melt.

If the spelter does not start of itself to flow into the crevices as the heating goes on, it may be necessary to jar the work slightly with a mallet or hammer. Care should be exercised in placing the mixture of spelter and borax so as not to have more at one point than another. When the borax has melted, if the spelter will not flow at the proper moment, a little more borax, in powder form, may be added as an additional help to the jarring already suggested.

Another method is to bell the one end of copper tubing so that a circular groove will be formed when the plain end is set in place inside. If the belling is suitably done, the operator may now put his powdered flux into the groove, filling up the bottom all round. The granulated or pulverized spelter may then be filled in to the top of the groove. Or, a mixture of spelter and flux may be filled into the space.

Dip Brazing.

The *dipping* method already mentioned may at times be used where there is a good deal of small work. A suitable pot containing the spelter is heated by a proper fire. The fire may be underneath and rise on the sides all round. A quantity of the flux is put in. The difference in specific gravity will cause the flux to form a molten layer on top of the melted spelter. Suppose the work to consist of a lot of rings. As the ring or a large part of it is to be immersed, it will be convenient to protect the parts of the work not concerned in the brazing. This may be done by using a special *anti-flux graphite.*

When all is ready, the ring held by a suitable appliance is dropped down into the flux in such a way as to provide for covering the surfaces that are to be brazed together. After a little, the region of the joint will have heated up and the flux will have cleared off the surfaces. The article is now immersed more deeply in order to get the joint into the melted spelter. Here the brazing takes place automatically.

The necessary depth of the layer of flux will naturally vary with the work and the size and character of the joint. In this procedure there is absolutely no interference from the atmosphere after the flux has done its work.

THE NEW YORK AUTOMOBILE SHOW.

THOSE of us who have been bewailing the fact that industry could not return to normal within another six or eight months, are interested in the fact that the New York show will be held this season. Despite the fact that the exhibition will be staged early in 1919, the event is suggestive in that it shows the return of the industry to normal conditions.

The week beginning February first, and ending February eighth, will be devoted to the exhibition of passenger cars and accessories. The show will be held at Madison Square Garden, and undoubtedly will be more largely attended than ever before, for the reason that every interested buyer will surely be there.

Following directly upon this, and continuing until the following Saturday night, will be held an exhibition of trucks. This second show is to be held at the same place, and is made necessary because there is no place in New York where a combined show, embracing both lines of the trade, can be held. Our next number issued in January will contain all the details relative to these shows.

A NEW GASOLINE SUBSTITUTE.

After many months of experiments and satisfactory tests conducted by Major O. B. Zimmerman and Capt. E. C. Weisgerber of the Research and Development Division of the General Engineering Depot at Washington, a new fuel of which kerosene is the base, has been announced. It is claimed that this mixture, which is termed "liberty fuel," is odorless, tasteless, and non-corrosive. It leaves less residue of carbon than gasoline, requires less oxygen for combustion and is said to develop greater horespower.

As a matter of fact it is claimed that the force of the explosion has been found to be 30 per cent greater than that of gasoline. The people who have been interested in this product claim that the substitute can be made at a lower cost than gasoline can be purchased. The process of manufacture is simple and the ingredients cost but little. It is hoped that the public will soon benefit by this discovery.

MENDING TOP BOWS.

Top Bows Can Be Mended by Binding Splints Across Them, But the Job Has an Unsightly Appearance.

ONE thing that the war has done for me is to teach me how to conserve, not because I wanted to learn, but because I couldn't afford to be quite as extravagant as formerly. A short time ago I tried to run my car beneath a shed that was just half an inch too small for the machine—that is, the roof of the place was just on a level with the top. Consequently, as the shed was strongly constructed, my top yielded up the ghost and telescoped into itself before I knew what had happened.

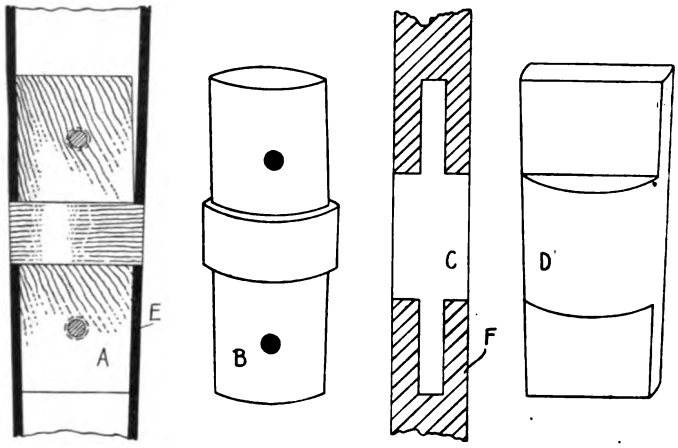
Before the war I would have thrown the top in back of my neighbor's garage (all his empty cans are behind

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my garage), then gone to the topmaker's and in one compound word said "giveusanother."

As it was, however, I tried to manicure and massage the bent tubes into shape. I didn't succeed, so I took the wreck to a topmaker and suggested that he do his derndest—he did.

I hung around for a while and watched him work, thought it would make a good story for the ADR.



Repairing Bows and Bow Irons.

In the first place he removed the covering material from the bent portions and broken bows, so that he would have room to work. Then just above each dent or bend he cut the tubing across with a hacksaw.

He carefully trimmed down a piece of pine wood into shape that approximated the inside of the tube and drove it into the tube. After a little coaxing the tube was straightened out, except for the extreme ends, where it had cracked. He cut off this cracked place and then turned out a piece of oak into the shape shown at B in the accompanying sketch.

After he had fitted this plug to the tube he drove it in and then drove the other part of the tube over it, as shown at A. I noticed that he used plenty of orange shellac, and finally he pinned the plug into place by two rivets, one in each part of the tube.

A few of the wood bows were so badly splintered that they were discarded, but two of them at least were repaired by doweling, as shown in Figure C. The dowel pin was shaped by hand, as shown at D, and glued into place. After the joints had been given a couple of coats of paint, one would hardly know where the repair had been made.

BENDING WRENCHES.

By CHAS. E. DURYEA.

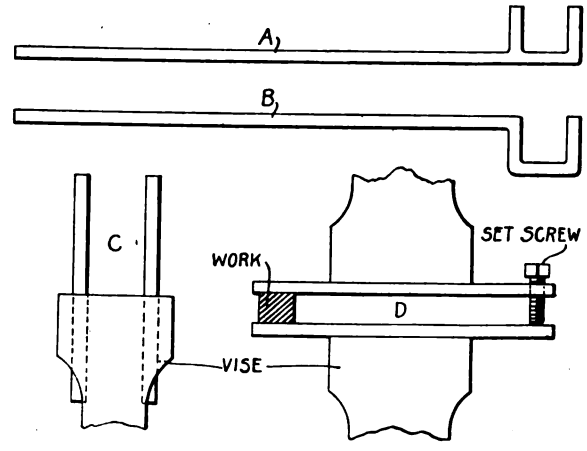
The carriage trade was the logical medium to handle automobiles, but too often those most in line failed to see the opportunity, and so in this case both industries lost much of value. Every carriage shop has bending wrenches for the many jobs that need them, but the auto, being factory made, has less need and the repair man almost no knowledge of them.

A bending wrench differs from the usual kind, in that its jaws have no corners. They are usually simply two round fingers welded to the end of a bar. Sometimes the bar itself is bent to form the fingers, as at B in Figure I, but this shape, although easier to make, is not so handy to use. The sketches make these two shapes clear. In forming the ornamental iron work often found on carriages, something to bend without marring the metal was needed.

Often there is need for such a device in the auto repair shop, and a very fair substitute can be made by gripping two round bars in a vise, as at C. These of course are not so firm and dependable as if they were part of a real wrench, and they have the disadvantage that the work must be brought to them, but they help out perfectly in most cases.

They can be kept from spreading by dropping a ring over their tops after the work is in place. If they seem too light and tend to bend, a monkeywrench can be used to apply a counter strain to their tops. They have the advantage that they can be spaced as desired. For bending wire or forming spring eyes a pair of small rods in the vise are often better than round-nosed pliers.

A modification of the idea, as at D, gives a good vise extension. Frequently a job is found that cannot well be placed in the vise. In this case two rectangular bars can be projected far enough above or to one side of the vise to catch the work properly and project beyond the vise jaws in the opposite direction. A block between the opposite ends fills a space as thick as the work, and

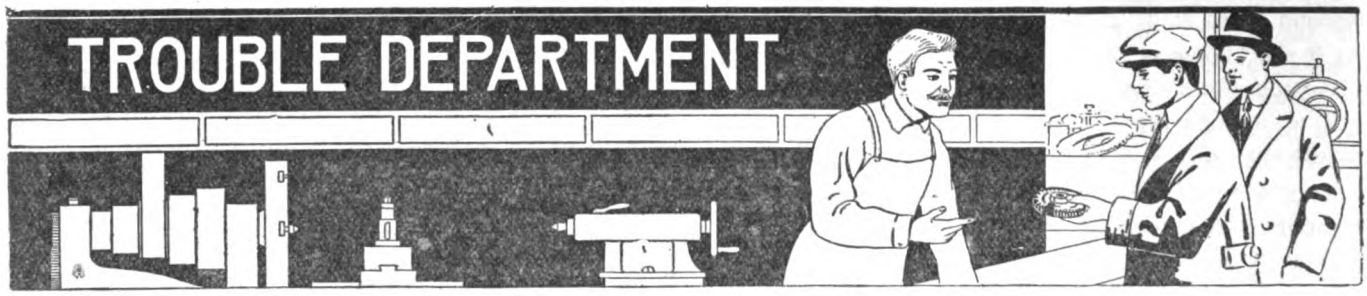


Illustrating Bending Irons and Methods for Bending.

when the vise is tightened both the work and the filler block are gripped.

If there is much work of a kind requiring such an extension the bars and block had better be held together by boring through them and inserting a bolt. If there is variety to the work a long set-screw tapped into the end of one bar makes an adjustable device so it is easy to get the bars parallel and thus best grip the work.

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We cheerfully answer the questions in our trouble department, but in many cases we are unable to diagnose the trouble properly because we do not have full details. Frequently we receive letters asking for information but giving no data upon which to work. We don't like to give opinions upon insufficient data; we cannot help you unless you tell us everything you can about your machine: the name, year and model, the kind of equipment, and the type of equipment where possible.

Be sure to sign your name and give your full address. Daily we receive letters which are returned because the name or address is not correct. Our department will not permit us to answer all in the magazine, and we like to answer a large part of the questions by mail; therefore be sure to give full address.

Knock in Maxwell Car.

2556

From N. S. Nicolaisen, California.—I own a Maxwell, 1916 model, and have had it thoroughly overhauled. It ran all right for a time, but now there is a knock in the engine. The repair man says the knock is in the timing gear and that there is nothing I can do for it. If you can help me I wish you would.

Can you tell me where I can obtain an instruction book that fully covers the Maxwell engine, the wiring, etc.?

Reply.—You have not given us details enough upon which to base a good opinion, and so we will have to generalize more or less.

If the knock is in the timing gear, there is little danger of damaging the engine by letting it go. The only things you will spoil are the timing gears themselves. If the knock gets worse, however, you had better replace both timing gears. Do not replace one without replacing the other.

It is very possible that if the trouble is in the gears, the knock is caused by a loose key. Remove the gears after having marked them, so that you can re-time the engine correctly and see that the key is wide enough to fit the slot. If it is not, a thin sheet of steel or tin can be wedged beside or upon the key to prevent any side play.

The Maxwell Motors Co. issue an instruction book which covers their car very thoroughly. Their address is Maxwell Motor Sales Co., Inc., Woodward and Warren Avenues, Detroit, Mich. If the book which they issue is not complete enough for you, we should advise you to purchase a Dyke's Encyclopedia.

A Real Mystery.

2557

From E. D., Iowa.—I have a 1916 Ford car which uses a great deal more water than it should, though I am sure the water does not leak from the radiator or the engine. After running this engine from 15 to 20 miles, nearly a gallon of water will be dissipated, though the engine does not overheat. Will you kindly give me your opinion on this strange case?

Reply.—Your problem falls into the same class with those presented by our friend Houdini, who, when placed inside a cell, double-locked, manages to escape. Since you are sure that the water does not leak from the system to the ground, or does not evaporate because of engine heat, there is only one possibility. That is, that the water leaks into the cylinders, and is vaporized and blown out through the exhaust.

Your trouble is in one way a blessing, and saves you money. At the present time there are upwards of one hundred devices on the market which are used to introduce water into the cylinders to prevent carbon. Your engine takes care of this in itself.

The only trouble seems to be, however, that the water leakage is too great. Remove the cylinder head and replace the gasket with a new one, and we feel sure that the water leakage will be reduced to a minimum. In replacing the gasket be sure that you coat it with a mixture of cylinder oil and graphite so as to make it watertight. Shellac will do, but does not answer the purpose as well as the graphite mixture.

Let us know the result of this repair, and if you are still in trouble we will write you again.

Broken Differential Part.

2558

From J. J. Crowe, Maine.—A few days ago while I was driving my Ford car, something seemed to snap in the rear and now the car will not run. If you think the trouble is in the rear axle, will you please tell me how to fix it?

Reply.—It is an easy matter for you to locate the trouble in your car. Jack up one of the rear wheels and have someone press upon the brake pedal. Try to turn the wheel that is free from the ground. If you find that you can turn it with little or no effort, it is an indication that one of the gears in the differential is broken or that there is a broken propeller shaft. If you find that you cannot turn the free wheel where the brake is engaged you may be fairly sure that the trouble is in the gear-set.

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To make sure of this matter it is always best to try the above experiment, then move the car along a few feet and try it again.

It is very possible that one or two teeth are broken from the differential gears, and in this case the experiment would not be satisfactory. You should move the car along, then try the experiment a second time. The only way to make a repair is to renew the gears or the broken shaft, and to do this you will be obliged to remove the rear axle.

2559 Engine Would Not Start.

From H. A. Bill, California.—I have a 1915 Studebaker four-cylinder car, equipped with a Wagner starter and generator, a Remy distributor and a Willard storage battery. A short time ago I was unable to start the engine. When I turned it over by hand, I found that the ignition system gave a good spark, so I primed it, still no results. I called upon a repair man finally, and he started the engine in a few minutes, but I didn't see how he did it. Now if that same thing happens again, I would like to know how to start the engine and would like some suggestions from you.

Reply.—Probably your trouble was due to the fact that you did not spin the engine fast enough in starting it, and that some of the gasoline which poured in the tops of the cylinders collected on the plugs and short-circuited them. In priming an engine to start it, you must always be careful not to use too much gasoline. If you do, this liquid will cut the cylinder oil, and you will get little or no compression.

Probably what the repair man did to start your engine was to pour about two teaspoonfuls of lubricating oil in the top of each cylinder, removed all the plugs, spun the engine a few times to distribute the cylinder oil, cleaned the plugs and replaced them; then primed the engine with about one-half of a teaspoonful of gasoline to each cylinder.

If you have any further trouble with this engine be sure to examine the breaker points, which are located just beneath the brush of the distributor. See that they separate about the thickness of a visiting card and be sure that they come together fully when the roller is not riding on the cam. Sometimes the distributor points do not snap together quickly enough—especially when the spring is weakened or when the points are corroded.

2560 Heating the Carburetor.

From J. W. Cobie, Iowa.—I have an engine fitted with a carburetor which formerly was connected with the water jacket of the engine. Now this engine has no water pump and the water will not circulate in the carburetor jacket. Would it be practical for me to connect the carburetor jacket with the exhaust manifold?

Would it be advisable to run a pipe from the exhaust manifold through the intake manifold to heat the mixture?

How much weight will a magnet lift? Does it make any difference whether I use iron or lead for the weight?

Can I connect batteries with my K. W. magneto for starting?

Do I-head engines require a better plug than L-head engines?

Reply.—There should be no objection to connecting the carburetor water jacket with the exhaust manifold, as you suggest, provided you connect the outlet of the jacket into the exhaust line or run the outlet tube back for at least three feet beyond the carburetor so as to prevent any chance for the fire to ignite the gasoline.

We would not advise you to run the ½-inch pipe through the intake manifold, for you will cut down the size of the intake manifold greatly. In addition to this you will cut down the velocity of the gas passing through the manifold, which will give you unsatisfactory results.

There is no specific rule for the amount of weight which an ordinary magnet will lift—manufacturers only can give this figure for their type of magneto. All weights should be of cast iron because lead will not stick to the magnets.

Do not connect batteries with your K. W. magneto. They will damage the machine.

I-head engines require a spark plug that will stand more heat than L-head engines, for the reason that the plugs in the L-head engine are cooled by the intake gas.

2561 High and Low Speed Engines.

From J. C. Strong, Colorado.—Will you kindly tell me in your trouble department the physical characteristics of high and low speed automobile engines? The Chalmers manufacturers claim 3400 R.P.M. for their engine, and the Continental engines of the same size, stroke and piston claim only 2600. Why?

Reply.—Your question is best answered by telling the qualifications necessary for high speeds. Let us assume first that we have an engine fitted with heavy pistons and connecting rods, and a crank shaft of the old type which is not counterbalanced. We will assume that the pistons, together with the connecting rods and the crank pins, the latter purely theoretical, weigh one pound.

Let us see what happens when the engine is running at a speed of 1,000 revolutions per minute. Let us assume that the stroke of the engine is six inches, to make the example easy. For every revolution of the crank shaft the piston travels up and down, stopping, of course, at the end of each stroke. This means that one pound of metal must be set in motion 2,000 times per minute, and then this pound of metal must be stopped as many times.

Now, there are four pistons in a four-cylinder engine, which means four pounds for the total. The work which the engine must do then is to stop and start four pounds of metal 1,000 times each minute, and to move this metal at an average rate of 1,000 feet per minute; or, to state it a little differently, we move one ton of metal one foot in every minute at extremely high speed, then bring it to

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a stop, theoretically; then we use a great amount of horse-power just for moving the pistons, to say nothing about the other losses in the engine.

Naturally, in moving all of this metal at these speeds considerable vibration results. Consequently this engine is limited in speed. By removing a slight amount of metal from the pistons and connecting rods, we decrease their weight one-half. Possibly we use aluminum pistons, or we cut down the size of the connecting rods. Then only one-half as much weight is moved per minute; therefore the engine can be made to run considerable faster. There is a limit to which we can reduce the weight of the reciprocating parts, however; but there is still left one more point at which we can economize, so to speak, and that is in the crankshaft.

One might say that a crankshaft in a four cylinder engine for instance balances itself. Taken as a whole, the crankshaft does, but you must realize that the crank pin in number one cylinder is distant from the crank pin opposite in number two cylinder from six to eight inches, possibly even more. In other words the crank pin for each cylinder taken by itself is out of balance.

The manufacturers of the modern high-priced cars, the Chalmers is one, if we remember rightly, counterbalance the crankshafts, that is they place a weight upon the crankshaft near the crank pin, so that it balances the weight of the pin, and makes each unit independent of the others. If you will investigate the weights of pistons and the counterbalanced crankshafts, you will find that the reciprocating parts upon the high speed engine are lighter than the reciprocating parts upon the low speed engines.

Have we answered your question? If not let us hear from you again.

2562 Battery and Magneto Systems.

From J. Harry Kelley, South Dakota.—Can I install a high tension magneto and still retain the generator on my car for lighting and starting? I have a 1912 four cylinder Cadillac which is fitted with a double ignition system. One system operates from dry cells, the other from the battery. The dry cell system does not give satisfaction.

Reply.—There is practically no choice between a battery ignition system and a high tension magneto, in the writer's opinion. It is simply a matter of personal opinion and the amount of money that you care to spend.

If we understand correctly, your car is fitted with two sets of plugs, one set operates upon the present battery and generator system while the other is fitted with a special dry battery system.

This second system may be discarded and the plugs connected with the high tension magneto.

2563 Worn Oil Pump.

From A. L. Chavalier, Ohio.—I have a model 79 Overland car in which the oiling system works poorly. If I stop the car and let it stand for a few minutes, then start again the oil will run in the gauge all right but it will not work when coasting or going up hill. When the oil stops flowing into the glass gauge I notice air bubbles coming from the tube. I have cleaned the system well but it makes no difference.

Reply.—The trouble with your model 79 Overland is that the oil pump is so badly worn that it permits the oil to leak through it.

We would advise you to replace the working parts of the pump, for there is danger of ruining your engine.

2564 Vibration in Ford Car.

From A. C., Connecticut.—I have a 1915 Ford car which has been run 22,000 miles and is in good condition. At speeds under 15 miles per hour the engine is quiet and runs smoothly, but on higher speeds there is a great amount of vibration; what might cause this?

Reply.—If you are not troubled by knocks in the engine, we doubt very much if the cause for vibration is due to ordinary wear.

We are inclined to think that the flywheel is not properly balanced. We would advise you to remove the engine from the car and see that the magnets are properly balanced. Perhaps one of the pistons is heavier than the rest. Perhaps also there is trouble in the drums with the transmission.

At any rate, the only way you can find the trouble is to remove the engine from the car. Before doing this, however, be sure that all the engine retaining bolts have been properly tightened.

2565 Engine Wrongly Timed.

From F. B. Perkins, Michigan.—I have an Overland car, model 83, cylinders cast separately. It is equipped with a Wilmo manifold, a Tillotson carburetor and a Dixie magneto. Am troubled by the engine overheating and on ordinary runs the water will boil in the radiator. This causes the engine to knock when accelerated and a very slow "pick up." Piston heads carbonize rapidly. Mileage has fallen from 17 to 11 miles per gallon.

All the valves have been ground, carbon scraped from the cylinders. Compression has never been better. The jackets have been cleaned and I am sure that the cooling system is not stopped up. Engine never smokes, and I have tried many kinds of the best oil sold with no noticeable change. At present the engine consumes about one quart of oil in every 500 miles.

As far as I know the timing has never been changed though I can carry the spark fully advanced at all times without causing the engine to knock. The muffler and exhaust line has been cleaned.

I have tried all kinds of carburetor adjustment and found that the engine sems to overheat more when hot air is fed into it. Can you help me?

Reply.—You have left but three possibilities for trouble and overheating.

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First, it is very possible that the spark occurs too late and if this is the case, the timing must be advanced somewhat. First turn the engine over until the piston of No. 1 cylinder is at the top of the compression stroke. Both valves will then be closed and No. 1 cylinder will be ready to fire. Remove the cover from the Dixie magneto and see if the breaker points are starting to separate. If they are not, you will have to uncouple the magneto shaft from the engine and turn it in its direction of rotation until the breaker points start to open. Be sure that your spark lever is set in the fully retard position. To make this a little more clear, we will state that the points will be together in this position, but as soon as the spark lever is moved in the slightest, the points will separate.

When the setting is obtained, couple the magneto to the engine again. Remove the cover from the distributor and note under which terminal the brush is placed. Connect this terminal with the spark plug in No. 1 cylinder, then connect the rest of the wires in their proper firing order. With this setting, you should be able to advance the spark to its maximum.

Your second possibility for trouble is retarded valve opening. Be sure that when the engine is heated, the clearance between the exhaust valve stems and the tappets is not more than three one-thousandths of an inch. Then notice at what point in the piston stroke the exhaust valve closes for any one cylinder. The exhaust valve should close at approximately top dead center, and should open between 40° and 45° before bottom dead center.

We doubt if your trouble is in the carburetor, and are fairly sure that you will find it to be due to a retarded spark or retarded valve opening. If you still have trouble after having followed our advice, let us hear from you, telling us what you have done, and we will advise you further.

Kindly let us know what condition the valve seats are in. It is possible that the valves have been ground into place so many times that the valves are below the surface and do not permit the exhaust gases to pass through them fast enough.

2566 Chalmers Planetary Transmission.

From T. A. M., Missouri.—I have a Chalmers car of the old type fitted with a planetary transmission. This car was purchased second hand and it looks as though the transmission had never been lubricated. Should it be oiled?

Reply.—This transmission should have been lubricated at all times with as light a grade of lubricating oil or grease as is practical without undue leakage. Wherever any unit is fitted with gears of any sort, lubrication is necessary. There are no bearings on the market which can be used without lubrication of some sort.

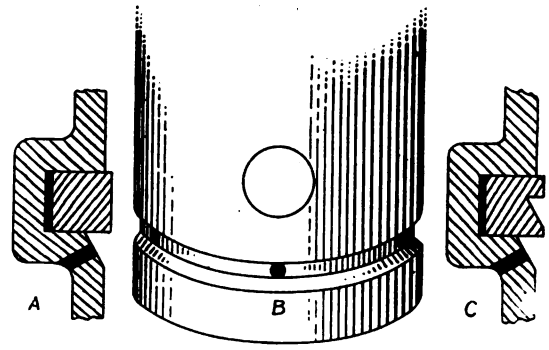
There is only one unit that can be operated without lubrication and that is a dry disc clutch, but even this requires oil in its bearings.

You may have to experiment considerably, but a light engine oil can be used in your transmission if the casing will hold it, otherwise use as light a lubricant as possible. If the casing is full of cracks or openings, you may have to use a medium or heavy grease, but be sure to give it some sort of lubrication.

2567 Spark Plugs Foul.

From L. J. E., Idaho.—I have a Hollywood Model Paige Car which gives me lots of trouble in that the spark plugs foul with oil very quickly. I have cut down the troughs as the manufacturers recommended but with no results. Would you advise the drilling of a series of small holes in the top piston ring groove? In your October number you have an article by W. O. Mann, in which is mentioned a type of ring, the "Always Tight." Are these rings sold by the Munger people? How many new rings should I install?

Reply.—In answer to your letter relative to a Paige car, first we should advise you to try a complete installation of leak-proof rings in your car. The rings which Mr. Mann speaks of in his article are those sold by the Splitdorf Electrical Co. of Newark, N. J., advertised in our October magazine on page 11, which you refer to.



Remedying Oil Troubles—Holes May Be Bored as Shown at A or B, Beneath Wrist Pin or in First Groove Above It. C Shows Special Ring and Hole.

In addition to this installation, we should advise you to bevel the lower edge of the piston ring groove, directly above the wrist pin, and bore a series of 1/16 inch holes 1½ inches apart, evenly spaced around the circumference of each piston. The face of the bevel should not be more than 3/32d of an inch, and the holes bored so that they will slant downward towards the inside of the piston. We feel sure that with the installation of the leak-proof rings and the boring of the holes, your troubles will cease.

2568 Starter Will Not Operate.

From A. T. Jones, New York.—I own a 1913 seven passenger Studebaker car and have just had new cells installed. When I put the lever to the starting position, the starting motor will not work. It seems as though the chain is not tight enough. Is there any adjustment for this? What do you think is the trouble?

Reply.—You may have any one of a number of troubles with the machine and to find them proceed in the following order:

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First make sure that the battery is in condition and that the wires connected with it are not broken or grounded. Turn on the lights and if they burn you can be fairly sure that the wires are connected. Trace out the wires from the battery to the starting motor and see that they are not broken or grounded.

Clean the starting switch and see that all terminals are in good condition. Disconnect the two wires from the starting motor and have someone press down on the starting switch making the contact. Then with a small piece of wire touch the two ends of the wires disconnected. Snap the connection quickly, don't hold them together or the battery will be damaged. This experiment will show whether or not current is passing through the wires with the starting switch in.

If current is found to pass through the wires, connect one of them to its proper terminal and snap the other against its proper terminal, still holding the starting switch in. If you get a spark you know that the wiring is all right to that point. If not, evidently there is trouble in the starting motor. Examine the brushes and see that they rest on the commutator. If the brushes are all right and the current passes into the motor but motor shaft will not revolve, then you will have to take the motor to a motor repair man.

If the shaft revolves, however, but does not turn the engine over, the trouble is probably in the overrunning clutch which is keyed to the crankshaft and driven by the motor starting chain. You will be obliged to remove this overrunning clutch upon which is mounted the sprocket and clean it, replacing broken parts, etc.

The chain can be adjusted by moving the starting motor upon its hinge. If you cannot tighten this chain this way, remove a link. If you still are unable to find the trouble, advise us further, telling what you have done and what you have examined.

2569 Bosch Magneto For Charging.

From E. J. Peelman, Pennsylvania.—I have a Bosch, high tension, four cylinder type magneto. Is there any way that I can arrange this magneto for charging a six volt storage battery? I would like to run it with a belt and would like to know how fast it should be run.

Reply.—The Bosch magneto generates an alternating current, the strength of which varies with the speed of the magneto. This current would ruin a storage battery within a very few minutes or else the storage battery would ruin the magneto. Neither is there any way or any attachment made that you could use to enable you to charge the storage battery from a high tension magneto. The only thing that you can use this magneto for is ignition. The armature must be driven either by gears or by a chain at crankshaft speed which is equivalent to twice the speed of the camshaft. A belt cannot be used for driving the unit. Neither is the current from the magneto strong enough to operate the lights of your car.

We feel that it would pay you to attach this magneto to your Ford car and use it for ignition purposes only. The Bosch magneto people manufacture a fitting which will enable you to attach the magneto and drive it from the timing gears. This fitting may be obtained from the Magneto Parts Co., 1790 Broadway, New York, or direct from the Bosch Magneto Co., 223 West 46th Street, New York.

2570 A Sharp Metallic Knock.

From A. H. Christie, Nebraska.—I have a Hudson phaeton 1918 model and when this car is driven up even a small grade or hill on high speed the engine knocks with a sharp metallic sound. When going on the level at about 40 miles per hour it knocks also. I have had it to a number of repair men but they could not agree. One of them said that the compression was too great.

Lately on changing gears, they would grind and in changing from low to intermediate, considerable force is necessary. I find that by pushing the clutch only half out, the change can be made more easily.

Reply.—Your trouble with this car is due either to excessive carbon, a loose connecting rod or a loose main bearing. We doubt very much if the trouble is caused by excessive compression. Since the manufacturers of the Hudson car know just how high this compression should be, doubtless their designers have taken the greatest of care not to make a mistake in designing the cylinder head.

The writer is unable to say just why the change from low to intermediate cannot be made easily. He has found by experience that this same trouble is encountered upon many cars. It is possible that it is due to insufficient lubrication of the clutch throw-out collar which results in wear, and sooner or later the clutch does not spin as fast as it should upon its rollers. The little grease cup close to the change gear quadrant should be turned down very frequently. The new car owner frequently allows his car to stand on the curb with the gears in mesh but the clutch thrown out. Such a procedure results in excessive clutch thrust bearing wear and consequent trouble. We should advise you to examine this unit of your car.

2571 What Is Petroleum Ether?

From W. M. Schwingel, New York.—I have a Maxwell 1916 car and experience considerable difficulty in starting the engine on a frosty morning. My machine is equipped with a Simms magneto and regular type K carburetor. I notice that the 1919 models have Atwater Kent ignition and I think a Johnson carburetor. Would you suggest that I change my equipment? The engine starts easily after it is heated.

Could I use some other ignition system, the Delco for instance, on this car? I appreciate that the present day grade of gasoline is in a large measure responsible for my trouble but not all of my acquaintances have the

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same trouble in starting their engines as I do. Many garagemen have said that it was characteristic of old cars, to start hard.

Can you inform me where I can procure petroleum ether? I have tried at a number of drug stores but to no avail. Most of the druggists say that there is no such thing.

Reply.—Your letter to a certain extent answers itself, as far as the difficult starting is concerned. You state that immediately the engine is heated it starts easily, which proves conclusively that the trouble is not in the ignition system.

Very probably the manifold on this car, or we should say the intake system is not designed as well as the later types of cars. We doubt if your trouble is in the carburetor. Very probably in starting the engine on the cold mornings the gasoline is condensed before it reaches the explosion chamber. The only two remedies are priming and heating.

We should advise you to investigate priming and heating devices, and install a priming device in your engine, or arrangement of some sort of a manifold heater.

We are not able to advise you authoritatively concerning the product which you term "petroleum ether." There are two general groups of hydrocarbons. One group is distilled from vegetable products—the other from mineral oils. From the first group, if we remember rightly, are extracted the methol spirits, and it is from this group that sulphuric ether is taken. The second group, if we are not mistaken, is headed by the more volatile elements of which benzine is the highest.

If there were such a thing as petroleum ether, it would be a very distilled product from the second group. It would be classed, probably under the heading of benzine.

Sulphuric ether is extracted from the methol group. As far as we know, the derivatives from the methol group of which sulphuric ether is one more volatile than those from the second group or the benzines.

The writer always found that sulphuric ether was volatile enough to explode an engine even on the coldest day.

Removing Scale From Cooling System.

2572

From E. J. Kuebel, Texas.—I have a Ford 1914 car which is fitted with an air friction carburetor. When the car is being driven from eight to ten miles per hour the cooling water in the system is boiling hot. As far as I know everything about the engine is O. K., the carbon has recently been removed, and the valves fixed. It is possible that some scale is formed in the water jacket. How can I remove this scale? Do you think that this is the whole trouble?

Reply.—Your trouble is undoubtedly due to deposits of scale, etc., in the radiator system. This scale or deposits can be removed by either or both of two methods.

Mix up a strong solution of potash, lye and water. Strain it through cheesecloth to remove the dirt and the lumps, and drain off the water from the radiator system. Fill it with the potash-lye solution and let the engine run for five or ten minutes until it has thoroughly warmed. Let it stand for about fifteen minutes, and start the engine until it has heated again. Drain off the solution and flush the radiator and water jackets well with water. Turn the hose right into the radiator, if possible, and let it run for ten minutes in order to remove all traces of the potash solution; then refill with clean water.

If the engine still overheats mix up a strong solution of washing soda and water, strain it through cheesecloth, and use it in the same way as the potash solution. After this treatment it is best to replace the rubber water connections with new.

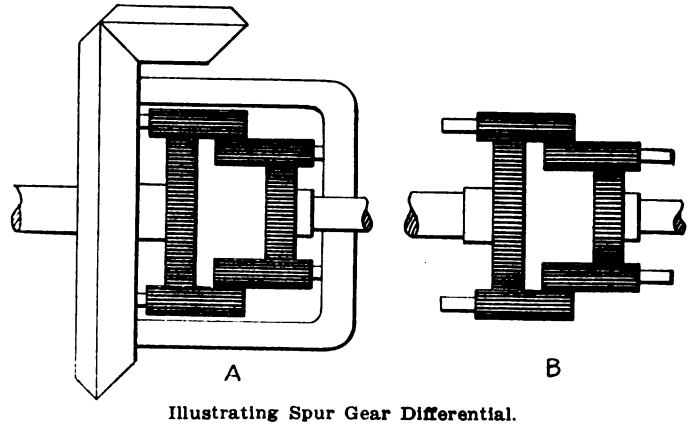
Before applying either of the solutions, if it is possible, we should advise you to clean the water jackets with a long flexible iron, scraping off as much of the scale as you can. If you still have trouble after this treatment, let us hear from you again. Be sure to tell us how the engine is timed, that is, at what point of the piston travel the exhaust valve opens and closes.

Spur Gear Differential.

2573

From W. B. Hiler, Texas.—I would like information concerning the action and construction of the spur gear differential.

Reply.—We give herewith a diagram to illustrate the



Illustrating Spur Gear Differential.

principle. The driving gear is riveted or bolted to the differential housing just the same as any ordinary differential. Inside the differential housing the differential gears on the ends of the two axles are spur, rather than bevel. These gears are shown on the sketch at A. Each of these gears meshes with a spur pinion gear as shown at B, and these spur pinion gears overlap each other and mesh.

There may be three or more sets of pinions. The pinions are mounted upon studs and the studs are fastened to the differential housing.

Ignition for Stationary Engine.

2574

From C. A. Williams, Oregon.—I have a stationary gas engine 7½ by 10 now fitted with a make-and-break

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ignition system. I want to rebuild it and instal a jump spark plug system, but have been told that such a system would not work well on so large an engine. Will you advise me?

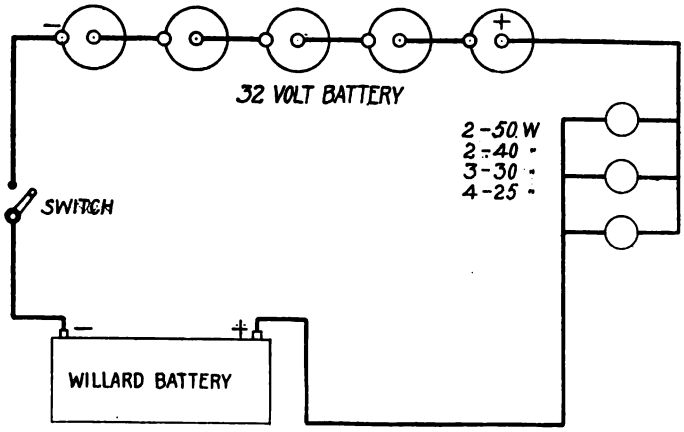
Reply.—We see no reason why you cannot use the jump spark system upon this engine, providing you can find some means of installing the spark plug at approximately the center of the combustion chamber, or over the intake port. The spark plug which you use must extend into the explosion chamber. A short plug will not give you satisfaction.

If we are not mistaken you can obtain these long plugs at an accessory sales room to fit any standard thread. You can use any vibrating coil, or any jump spark coil together with batteries for this system.

If you desire any information relative to timing the engine, or installing such a system do not hesitate to call upon us.

2575 Charging Battery from Edison System.

From W. F. Marsden, Iowa.—I have an Edison lighting plant in the basement, a 32 volt system, and would like to charge the battery of my automobile from this



Charging Willard Battery from Edison Battery System.

system. My automobile battery is a 6-8 volt Willard. Will you please send me a diagram and directions?

Reply.—We give herewith a wiring diagram showing how you can do this together with the sizes of lights to be used for resistance. As we can find no information relative to the connections of this lighting plant, we can only tell you to connect the positive terminal of your storage battery with the positive terminal of the Edison plant and the negative terminal of the Edison batteries through the resistance to the negative terminal of your storage battery. The switch may be put on the positive side as shown in the diagram.

2576 Headlights Burn Poorly.

From W. E. Stainback, North Carolina.—I have a model 11 Dort car, practically new. The first time I used the lights, I noticed that they burned irregularly, that is, bright for a few minutes, then dim, whether the engine was running or not. The engine runs smoothly and the starting motor works all right. I have been told that the generator is too strong. What do you think?

Reply.—Your trouble is undoubtedly due to poor connections in the lighting system, or grounded or short circuits.

We would advise you to examine the wiring connections at the lighting switch, and trace the wire which leads from the lighting switch, to the fuse box, and from wire connections are poor. Let us give you the circuit from the battery to the lights.

Current passes from the battery to the starting switch, and at the starting switch a wire carries the current to the ammeter. From the ammeter, the current is carried to the ignition, and lighting switch. Since you say that the ignition system is all right, the wiring to this point is correct. A common connection carries the current from the ammeter to one pole of the ignition and lighting switches. From the lighting switch, current is carried to the fuse box. At the fuse box wires connect from the tail lamp and from each headlight, and the current passes from the fuse box to each lamp, thence to the ground.

If all of the lights burn irregularly, you will probably find your trouble in the lighting switch or in the fuse box. If you still have trouble, let us hear from you again, and we will try to reply further.

2577 Ford Clutch Assembly.

From E. B. Council, North Carolina.—I have recently overhauled my Ford car and now the clutch discs stick. The Ford manual says: first put in a large, then a small and alternate, ending with a large plate. This leaves no disposition of the thrust plate. The instructions by Manley say: First put in a distance plate, then add a small disc, then a large one, etc., and finish with a large disc on the top, but this only accounts for 25 plates.

I followed Manley's instructions and added another distance plate, making a total of 26 plates. I started the engine but in about five minutes the clutch stuck. Would it matter if more than 26 plates were used? If two of each kind were put in alternately, would the clutch stick?

Reply.—You were right in putting a large plate in the drum first. Against this should be placed a small one and so on until the 26 discs have been used up. There should be 26 discs in addition to the master, or distance ring, and if you assemble it correctly, that is, place a small disc against the distance plate first, you should end with a large plate. Figure it out for yourself on paper, or use 13 small matches and 13 large ones.

Since you did not come out even, evidently you made a mistake and put two discs together. Even so, we fail to see why the clutch should stick, unless the keys which carry the discs have been worn unevenly. If you ended up with a small disc, the plates would probably stick anyway. You have added one extra plate, if we understand your letter correctly, which probably means that there is no chance for the plates to expand and release.

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Our only advice to you is that you remove the clutch unit and do the work over again. Examine the inside of the drum and be sure that it has no edges which will catch the discs.

Carburetor Does Not Leak.

2578

From A. W. Dahlin, Connecticut.—I have a Hudson 1912, model 33 car, formerly fitted with a Stromberg carburetor. Every time I stopped the engine I noticed a leakage of gasoline from the carburetor. I thought perhaps the carburetor was so old that it was worn out, so I purchased a new one, but the trouble still exists. Do you think it is the fault of the carburetor?

Reply.—There are two reasons why you should notice a leakage of gasoline around your carburetor. As far as a carburetor is concerned, if this is a new one, you probably will find no trouble with it. You may find, however, in connecting this to the fuel line, the joint has not been packed tightly enough.

The second possibility is that there is a hole in the fuel line at some point and the gasoline follows the fuel tube along to the carburetor where it drops. Of course you would not notice this under ordinary conditions only when the car is stationary. We should advise you to examine the connections at the tank and in fact the whole fuel line.

Platinum Points Burn.

2579

From D. A. Jamison, South Dakota.—Will you kindly tell me what causes both points in the breaker box of a high tension magneto to pit? (Usually, I should think that one point would pit, the other would build up.) Is there any way to change the direction of the current or change the wiring so as to reverse the current and prevent pitting?

Can the current from a Ford magneto be reversed to stop the points from building up or pitting?

Reply.—Excessive pitting of breaker points can be traced usually to broken condenser connections. Occasionally one finds that the condenser is not large enough to take care of the excessive current, but this is a fault of the design and occurs but seldom. The magneto system, including that of the Ford, operate upon alternating current, and since this current changes its direction of flow with every cycle, there should be no building-up action upon either of the points of the breaker box.

Since the current is alternating there is no way of changing the connections so that the current will flow more in one direction than in the other. In the battery systems, however, where special batteries are used for ignition purposes, the building-up action may be reversed by reversing the battery connections. Where the battery is used in conjunction with the starting and lighting system, the current flowing through the ignition unit cannot be changed by any practical method. The only remedy is to replace the points in question.

Carburetor Leakage.

2580

From W. A. Hoffman, Pennsylvania.—I have a 1917 Lexington car fitted with a Rayfield carburetor. This carburetor leaks gasoline and does not give good results. Will you kindly tell me how to fix it? There is a light click in the engine, possibly in the valves, which seems to disappear at high speeds.

Reply.—The trouble with your carburetor evidently is that the float level is too high, or there is a leak in the float valve, or base of the carburetor. The garageman should be able to repair the carburetor if you call his attention to it.

The level of the gasoline should be about one-eighth of an inch below the needle valve or jet opening. If your carburetor is not working properly, it is very possible that your trouble is due to faulty construction. There is little that you can do in the way of adjustment, and we should advise you to take the matter up with either the Rayfield agency, or the agents for your car.

The possible troubles are: wrong link connections between the metering pin and the butterfly valve, or poor linkage connections between the air inlet and the dash pot, or it is possible that the dash pot plunger is not properly fitted.

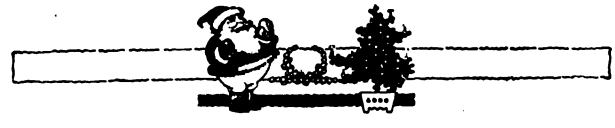
The clicking noise which you hear is probably due to improper valve clearance. After the engine is heated, examine the valve clearance between the valve stem and tappets, and be sure that this distance is not more than three one-thousandths of an inch in any valve. In making these adjustments, turn the engine over by hand until one of the valves has opened, and closed, then turn the engine one-half turn further, then adjust that particular valve. Do the same for all of the valves.

You may find that you have to run the engine after adjusting the first three valves so as to heat it again. If you still have trouble, let us hear from you again.

WHO IS RESPONSIBLE FOR THE ACCIDENT, THE OWNER OF THE CAR OR THE DRIVER?

HERETOFORE, in many cases where accidents have been the result of fast or careless driving, the owner of the car has shifted the blame successfully to the chauffeur.

By two recent court decisions, it has been held that the owner of the car is the man who is responsible. It is his business to check the chauffeur if he is driving too fast, exercising such control over him at all times as will prevent accidents through carelessness. Unless he does this he will be liable to damages through the courts. There has been and is altogether too much careless driving and something should be done to stop it, or at least to curtail it.



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An Interesting Interview With Charles Johnson Post

In analyzing the Congressional returns, Charles Johnson Post, director of the Publishers' Advisory Board, in an interview today stated that the Republican gains were the result of the mistakes and un-American policies—and specifically his opposition to the war and his vicious postal zone law blunders—in Congress of the Democratic majority leader, Congressman Kitchin of North Carolina.

"Mr. Kitchin," said Mr. Post, "at no time since the world war started understood or represented the great and fundamental American thought. A chart prepared by the National Security League Congressional Committee shows that seven out of the eight important bills relating to our war activities for the inevitable and righteous part that the United States was to play in the establishment of human rights were opposed by Congressman Kitchin and his vote was recorded against them. Congressman Kitchin voted against the declaration of war with Germany; he even voted against the Kahn amendment by which our army was to be raised after the war was declared. Mr. Kitchin was not an ordinary member of Congress giving expression to his individual views of personal pacifism or personal righteousness; he was the responsible leader of the majority party representing the Administration on the floor of Congress.

"This incredible style of leadership and thought laid the foundation for Congressional Democratic defeat. And the first opportunity registered the protest of the people against Kitchin and Kitchin methods in Congress. It is Mr. Kitchin himself who has defeated the Democratic party by persistent dullness and lack of vision.

"Mr. Kitchin's incapacity for leadership—which a mere seniority thrust upon him—is proven by the manner in which he used the War Revenue Act of 1917 as a means of punishing all the publishers—and their millions of readers—of the United States because they denounced him for his opposition to this war and his attempts to hamstring President Wilson's administration by voting against war with criminal Germany and opposing the draft that gave us our splendid American army. To illustrate:

"The War Revenue Act of last year dealt solely with the means of raising war revenues to train our armies and support them in the field. Yet into this purely war revenue measure Congressman Kitchin injected a postal amendment which he himself admitted, on the floor of Congress, *was not war legislation, but permanent postal legislation.* As postal legislation such a bill would have properly been referred to the Committee on Post Offices; but, by virtue of his power as majority leader of Congress, Mr. Kitchin, as chairman of the Ways and Means Committee, had this amendment introduced into the War Revenue Act and through his own committee denied the opportunity for discussion and hearings.

"Moreover, this proposition, known as the postal zone amendment, after full hearings and investigation, had been *twice defeated* in the United States Senate *at the same session of Congress.* This law resurrected a postal zone system that was abolished by President Lincoln; a zone system that has been denounced by every U. S. Postal Commission since then. Mr. Kitchin forced this destructive, vicious and un-American postal law into the War Revenue Act and went to the Senate Conference Committee and compelled its acceptance; since this emergency war revenue bill could not be delayed, it was thus that the vicious zone system was successfully jammed in by Mr. Kitchin.

"This destructive and un-American zone law divided the country into postal zones, with progressive and heavy increases of postage on periodical reading matter, according to the accidental remoteness of American citizens from the zone of publication. It meant that the great farming districts of the West—Kansas, Nebraska, Ohio and California—had to pay a heavy penalty postage upon their periodicals when that identical periodical was charged less postage to other American readers accidentally closer to the point of publication.

"So unpopular did this law immediately become that all over the United States boards of trade, chambers of commerce, granges and agricultural associations, civic bodies, libraries, cultural and educational institutions, religious organizations, to the number of almost seven hundred, began registering emphatic protests against this absurd zone law and demanded its repeal; Congress was deluged with petitions and letters of protest—which Mr. Kitchin ignored in framing the new war revenue bill which is now pending.

"The Congressmen—outside of the solid South—that had blindly followed his lead came mainly from the Middle West—Illinois, Indiana, Iowa, Kansas, Missouri, Nebraska and Ohio—and it is in these states that there is perhaps the greatest number of readers of periodicals. Twenty-four colleges of Illinois at a joint meeting demanded that Mr. Kitchin's destructive postal zone law be repealed. The National Educational Press Association, with headquarters in Nebraska, at its convention promptly did the same.

"That this postal zone law was an important factor in this Congressional election is clearly shown by the Congressional returns—particularly in these states above named. Fifty-nine Congressmen who voted for the unfair postal zone law were defeated for re-election, as returns to date show.

In California three pro-zone-law Congressmen were defeated.

In Illinois three pro-zone-law Congressmen were defeated.

In Indiana four pro-zone-law Congressmen were defeated.

In Iowa two pro-zone-law Congressmen were defeated.

In Kansas five pro-zone-law Congressmen were defeated.

In Missouri four pro-zone-law Congressmen were defeated.

In Nebraska four pro-zone-law Congressmen were defeated.

In Ohio six pro-zone-law Congressmen were defeated.

In other states the number of pro-zone-law Congressmen who were defeated was rarely over one.

"The non-partisan character of the returns in these significant states is clearly shown by the fact that five Republican pro-zone-law Congressmen were defeated and twenty-three pro-zone-law Democratic Congressmen. The greater number of Democrats suffering defeat is easily accounted for by Mr. Kitchin's lining them up to serve his reactionary and unvisioned 'leadership.'

"This comparison speaks for itself. The recent Congressional elections were no repudiation of President Wilson's administration; it was a rebuke to the jumble of war-time legislation expressed by the reactionary Mr. Kitchin of Scotland Neck—of nearly 2,000 population. Mr. Kitchin sought to punish publishers, and to do this he was willing to penalize every American home. He only succeeded in hacking his party and hamstringing President Wilson. Mr. Kitchin took no political risk in attempting hamstringing tactics, since he represents one of those Southern districts that would return a Democrat under any circumstances. But Mr. Kitchin and his dimlit Kitchinism have received the humiliating rebuke of public condemnation."

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The People Whom I Employ

BY LESTER G. HERBERT.

I HAD not been long in business for myself before I discovered that some people about me had a much better faculty for getting along with their employees than others. Some were always having disturbances, being left short-handed, and handicapped at most inopportune times for very much needed assistance, while others seemed to run along, year in and year out, without any difficulties of this kind.

It didn't seem possible to me that this was merely the result of chance or luck, and as I anticipated a long business career ahead of me, and hoped to be reasonably successful, I decided to keep a notebook on "How People Get Along With Their Help." In this notebook I jotted down from time to time conclusions and deductions. The good ones I put to work, and the ones of which I did not approve I used as a warning to myself to keep me out of trouble. In the course of a few years of this method I evolved, for myself, a set of rules which I unconsciously followed, and which have guided me for a number of years with such success that I believe I am justified in giving them to others. Personally they have been weighed and found "not wanting."

Several times men have been employed by myself and others who had to be persuaded, or, as it were, "baited" to accept the position. The relationship was never satisfactory nor long-lived, so I believe I am right in laying down the rule that the connection should be thoroughly agreeable in the beginning.

Hire the "Stickers."

Next, I never hold onto a man when he shows a disposition to make a change. I may possibly have a frank talk with him and discover his points of dissatisfaction. If they are reasonable, I do not feel that I compromise my dignity in any way to correct those conditions, but I never "hang onto" a man who shows a restive spirit, for I have found that if I satisfy him apparently by special and unwarranted concessions, that he does not remain satisfied very long. In short, cordial co-operation is only possible where there is no underlying dissatisfaction.

Next, I encourage my help to tell me where and how they can improve the work they are doing, in their opinion. I have learned that this gives them a greater interest in their tasks, and it is natural that the man who is doing a thing will think about it and concentrate upon it, and sometimes have constructive ideas to offer. To treat these as of no account is to discourage initiative and to chill enthusiasm.

Keep Up Interest.

I make a point of having ample time for conferences with each man about his work and to take an interest in him and his affairs, and also to plan some general get-together times, but unless the case is exceptional, I have found that too close intimacy between the business principal and the men he employs is undesirable. This is not because "familiarity breeds contempt," so much as that we are apt to place a less high value on the good opinion of those with whom we are too much. And the man who employs others to work for him must always be careful as to partiality. Then, there are always some who will take advantage, perhaps without meaning to do so, and be less inclined to yield to the necessary business discipline.

Another important point which I have incorporated into my platform is that about once in so often I make it a point to have a heart-to-heart talk with each man who works for me. If he has any faults which are lowering his efficiency, making results less than they should be, or is unconsciously falling into any errors of management, I point this out in a tactful way which does not arouse resentment.

Give Praise When Deserved.

On the other hand, if I have discovered, as I often do, points of special excellence, have noted conscientious effort, or unusual results, I take pains to give credit and cordial praise. I believe this habit has made more dollars for me than anything else, and that I may never forget to have these heart-to-heart talks, I jot down in my pocket notebook the facts of each one and when I plan to talk to him again. These talks are not, of course, in the nature of a curtain lecture, and oftentimes they are so arranged that the employee does not know that they are more than a casual conversation which just happened.

I take pains that the best trade literature in my line is within the reach of my employees, and I often read an article and purposely mark a paragraph or a sentence and give it to one of my men, saying, "Read that and give me your opinion on the article." Perhaps I care less for his opinion than to be sure that he reads it.

Be Thoughtful.

I am particular on another point concerning which some employers are careless—that is, I see to it with a reasonable degree of thoughtfulness that preferences are not ignored. For example, Howland always gets his vacation in June. That is the anniversary of his wedding, and he and his wife go to her people's and something in the nature of a celebration is enjoyed. It would be a serious disappointment to Howland to have his vacation earlier or later.

With the same thought of individual likes, Wilson is always provided with a light of a special type for dark days, as he has a peculiarity of eyesight which does not trouble him if he has the right sort of a light, and which,

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causes distressing headaches if he suffers the least eye strain.

Unless circumstances are unusual, my men have regular time upon which they can depend for themselves, and which seldom varies more than a few minutes one way or the other.

Personal Gifts.

I see to it at Christmas time that they are suitably remembered, and also keep in mind that men are better satisfied when they realize they are making some advancement in a personal way. From time to time I give the most trusted extra responsibilities, or require additional tasks of them, always balancing up with a little better pay.

I have found that many a man grows dissatisfied because he feels he is little more than a cog in the machine, so I strive to impress each with the thought that his work means a good deal to me. On the other hand, it is unfortunate for a man to get the idea that all business would stop without him, for it is a rare individual indeed whose place cannot be refilled.

Frequently when I find that I am facing a special difficulty, I ask one of my men whom I especially trust, or several of them, for suggestions. On a number of occasions I have had reason to know that this has averted the losing of a good man, for he has respected my confidence and evidently argued to himself, "I couldn't leave just in this crisis," or "We must all pull together."

Retain Discipline.

Getting along with one's help means a peculiar finesse which is a skillful balance of firmness and freedom, of appreciation and requirement, of ambition and caution, of interest and aloofness. To explain the last, I might say that during business hours I have found it invariably advisable to hold to business interests, even in conversation, otherwise discipline and loyalty would be threatened sooner or later.

This article was written for our readers who employ men, but should be of equal interest to employees, for they may read it and gain many lessons thereby. Be square with your employer, and he will be more apt to be square with you.—Editor.

NEW AND INTERESTING THINGS IN MOTORDOM

Pattern and Tool Plant Sought by Louisville, Ky.

It is announced by Tampton Aubuchon, general manager, that the Million Dollar Factory Fund of Louisville has appointed a special committee, composed of representatives of a number of large manufacturing concerns, for the purpose of negotiating with manufacturers of tools, dies, wood and metal patterns, with the view of establishing a tool and pattern plant in the Louisville industrial district.

The need of a local high-class pattern and tool shop is accentuated by the unprecedented growth of fifty-nine metal working plants in the Louisville industrial district during the past few years.

The committee has begun negotiations with a number of large tool and pattern concerns and it is believed that the necessary arrangements for the establishment of such a plant in Louisville will be consummated at an early date.

The Lo-See Hot Spot.

The principal reason why gasoline does not give the mileage today that it did a few years ago is that it does not vaporize so rapidly. In order to vaporize present day gasoline, considerable heat is necessary. Owners of old cars cannot always apply devices which are on the market because the design of their engine does not permit.

There is one fitting, however, which should be investigated by every car owner. It is sold by the Wee Specialty Co., 1806 Michigan Ave., Chicago, Ill. This fitting is clamped between the carburetor and the intake manifold, and is really a hot air stove. Hot gas is taken directly from the exhaust manifold and carried to the fitting. Gas passes around the fitting and is carried backward away from the carburetor.

The outside of the fitting is corrugated or fitted with fins to absorb the heat. Inside a peculiar arrangement of fins serves the purpose of heating the ingoing mixture of gasoline and air. A wedged-shape casting at the center of the fitting serves the purpose of heating the center of the passing gas. In this way there is no danger of unvaporized gasoline working into the combustion chamber.

The Dearborn Truck Company.

This company has recently purchased the good will and all materials of the Smith Motor Truck Corporation and intend to remove the same to their recently acquired factory building located at 2515-2535 W. 35th St., Chicago.

The general offices of the Dearborn Truck Co. are being moved to 2015-2017 South Michigan Ave., and will occupy two floors. The ground floor will be devoted to the display of their new models, while the second floor will be occupied by the sales, accounting, purchasing and advertising departments.

The Dearborn Truck Co. have recently added to their complete line of truck units the Dearborn Complete Worm-Drive Truck in two models: Model "F" 1½ ton, and Model "H" 2½ ton capacity; also the Dearborn Complete Chain-Drive Truck in two models: Model "A" 1-ton and Model "B" 2-ton capacity.

The latter two additions now give the Dearborn Truck Co. a very exceptional line of completed trucks and truck units which we know will receive recognition from the automobile trade.

Hammered Piston Rings.

An engine is usually known by the quality of its rings. It can be in the best of condition, but is worthless if the rings do not fit, or if they permit the gas to pass the pistons. The Hammered Piston Ring Co. of America, located at Newark, N. J., manufacture a piston ring which is without doubt among the first in quality of those made.

Ordinary piston rings are made from gray iron. The cheaper grades are simply machined. By hammering or peening a ring, a quality is imparted to it that can be had by no other means. By this process the metal is made tougher and more resilient. A hammered piston ring exerts an even pressure upon every portion of the cylinder wall. It does not age with use; that is, does not assume a permanent position, but retains its resiliency a great length of time.

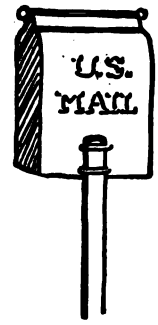
This is the type of ring that is manufactured by that firm whose address is given above. Heretofore this firm has devoted practically 100 per cent of its production toward winning the war. Their products were chosen for use in government engines which is ample proof that a hammered piston ring possesses much merit.

Hess-Bright Ball Bearings.

We are pleased to acknowledge the receipt of a book issued by the Hess-Bright Mfg. Co. entitled "The History and Development of Ball Bearings." This book tells and illustrates the use of Hess-Bright ball bearings in the automobile, in the airplane and in various machinery units. Our readers who are interested in the installation of ball bearings surely should write for this book. This company has a main office at Philadelphia, Pa.

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Do not lose any time

You'll need carburetors

when spring comes. It's going to be easy to sell good carburetors. It may not be so easy to get them.

But you know that any

Rayfield carburetors that you can lay your hands on are as marketable as gold dollars. Suppose you try ordering some in advance—and don't say we didn't warn you.

Service Stations and Dealers everywhere.

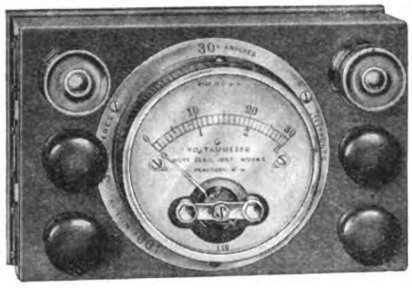
Findeisen & Kropf Mfg. Co.
21st and Rockwell Sts., Chicago

RAYFIELD CARBURETOR

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The Hoyt Rotary Meter.

The Hoyt Electrical Instrument Works of Pennacock, N. H., recently put upon the market a product called the Hoyt Rotary Meter, which is a volt ammeter, and trouble detector combined. It is claimed that this device when connected with the starting, lighting and ignition system of an automobile, will not only give the rate of current consumption as ordinary meters, but will give considerable more information, such as the voltage of the storage



Hoyt Rotary Meter.

battery, the voltage of each individual cell, and the current required for the starting motor.

In addition to this, the device can be used to detect leaks, grounds, short circuits or open circuits in armatures, fields or commutators of motors and generators. Everyone who is interested in the repair of automobiles should investigate this device which should prove to be "the trouble-man's right-hand partner," if we may use the expression. As a matter of fact the device should be of interest to anyone interested in automobiles.

Home Repair Guide Free.

The Miller Rubber Company, Akron, Ohio, has brought out a booklet entitled, "Guide to More Tire Mileage," which they say gives just the information which every car owner needs to know about repairing so as to make tires wear as long as possible. We understand that a copy of this book will be sent free of charge to any reader who will mention the Automobile Dealer and Repairer when writing for it. It would seem to be well worth sending for.

F. W. S. Roller Bearings.

Ever since the Ford car was placed upon the market many years ago, car owners and repairmen have been in search of some sort of a bearing to replace the ball bearings in the front wheels of this car. F. W. Stewart, 1406 Michigan Ave., Chicago, Ill., in putting on the market the F. W. S. improved roller bearing, answered the problem.

This roller bearing can be used both in Ford and Chevrolet front wheels as a replacement part for the old fashioned ball bearing. The inner race or cone is made of a specially prepared steel carefully hardened and ground to the correct size.

This part fits upon the Ford or Chevrolet front wheel spindle in place of the regular cone. Upon it are mounted the large rollers which are contained in a strong steel cage, which is reinforced by a heavy turned edge. Surrounding the roller and cage assembly is the outside race or ring which, like the inside cone, is carefully ground and hardened.

Autoists who find that the ball bearing in the front wheels of their Ford or Chevrolet cars are rapidly destroyed by wear, should investigate these bearings. The cost is low and satisfaction is guaranteed.

Duplex and Simplex Governors.

Invariably when one investigates the cause for truck dissatisfaction, one finds that the primary cause for trouble lies in the fact that the driver has attempted to run the machine at passenger car speed irrespective of load or road conditions.

The owner or manufacturer can hardly control his drivers when they are on the road. He can make rules, but the drivers will not follow them. There is only one means that he can adopt to prevent overspeeding of his truck, that is to install a governor.

The Duplex Engine Governor Co., Inc., 36 Flatbush Ave. Extension, Brooklyn, N. Y., manufacture governors for internal combustion engines. These governors are applied between the carburetor and the engine at any convenient point and are so arranged that they cannot be tampered with or disconnected without the knowledge of the owner With one of these governors attached, the truck owner is sure that his machine will not be driven above a certain speed.

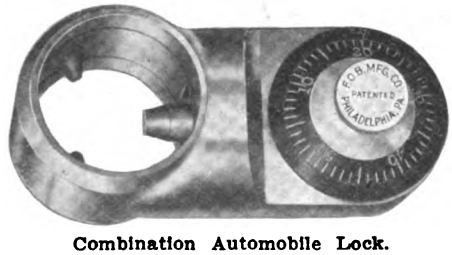
The governors made by this concern control the speed of the engine to a predetermined limit without decreasing the power. When the car is stationary or fully loaded the governor does not prevent the use of all the reserve power in the engine.

Every truck owner should investigate such equipment for his machine. It amounts to insurance upon his equipment as a governor is a guardian of safety and reduces the cost of upkeep as well as saves the cost of repair bills.

Combination Automobile Lock.

One would never think of leaving a bundle of bills upon his desk with no one there to guard it, nor would he think of leaving any money in the corridors of his office building. That same person does not hesitate to leave his automobile on the street unguarded and unlocked. Many manufacturers have tried to build an automobile lock and many of them have failed, but the F. O. B. Mfg. Co. of Philadelphia, Pa., have produced a device which would seem to solve the problem.

This device, which is illustrated here-



Combination Automobile Lock.

with, is a combination lock, and requires no key. It consists of a heavy casing of aluminum alloy which is mounted upon the steering column of the automobile. At one end of this casing is fitted a combination dial. Inside the device and resting against the tumbler of the lock is a bolt pin which extends into the steering column against the steering shaft.

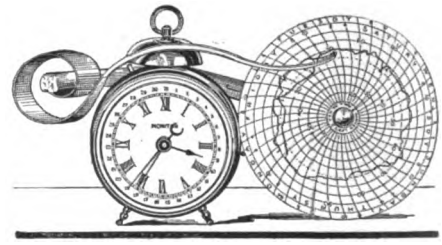
When the tumblers are set at the proper combination this steel pin falls back and releases the steering shaft so that the car can be steered in any direction. When the steel pin is locked against the steering post or shaft, however, the wheels are held rigidly, and the car cannot be driven or towed except in a straight line.

Manifestly, a thief cannot go very far with such a car. The combination feature is interesting for the reason that one need not carry a key. The aluminum alloy of which the device is constructed is said to have a tensile strength of over 30,000 pounds to the square inch; therefore there is no danger that the lock will be broken by the thief.

Heatrec.

The Duryea Laboratories, 18th St., Philadelphia, Pa., have put upon the market an interesting device which should be installed in every garage where automobiles are stored. The device is known as "Heatrec," which is really a recording thermometer. It furnishes a permanent record of the temperature in your garage during the specified time.

There can be no dispute should radiators freeze while they are on the road. If you keep your garage above the freezing point, Heatrec furnishes a record which



Heatrec.

proves your statements. Heatrec shows the temperature at all times and by comparison one can tell whether or not the heat is rising or falling in the garage.

While the regular thermometer only tells existing conditions, Heatrec shows conditions which existed during a period of time passed. Therefore it is indispensable in keeping the temperature even.

Two "Yankee" Books.

North Bros. Mfg. Co., N. E. Cor, American St. and Lehigh Ave., Philadelphia, Pa., have just issued two interesting booklets, one of them entitled "Yankee Tools in the Garage," the other "Yankee Tool Book." Both of these books describe the various up-to-date labor-saving tools manufactured by North Bros., and illustrate them fully.

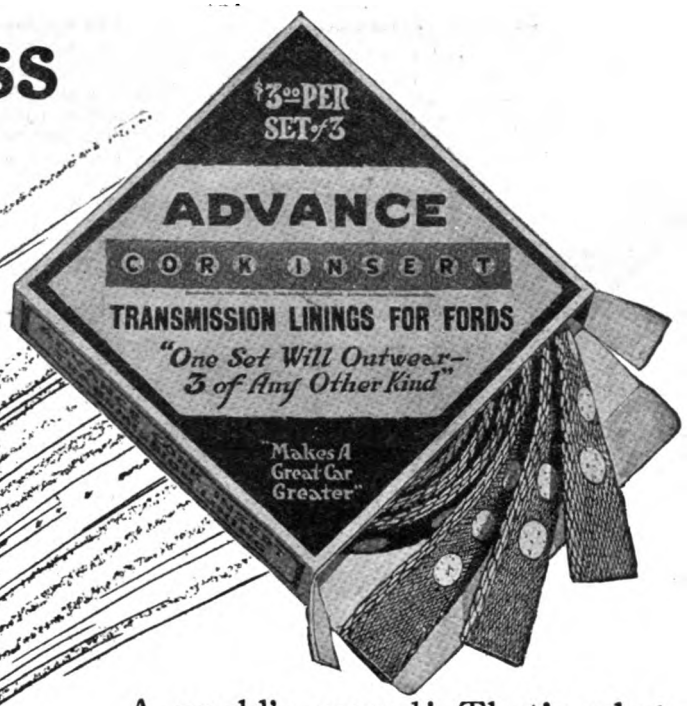
For many years North Brothers have made celebrated tools of many kinds; tools that are indispensable to the automobile repairman, or the mechanic. Every one should write for these booklets, which will be sent free to our subscribers.

Martell Reamer Correction.

In the November issue of the Automobile Dealer and Repairer, on page 64, we described the Martell line of reamers manufactured by the Taft-Peirce Mfg. Co. of Woonsocket, R. I., and made special mention of the Martell aligning reamer for reaming main bearings. The wrong illustration was used for this article. We showed one of the small hand reamers instead of the larger ones. The Taft-Peirce Mfg. Co. are marketing Martell reamers, which are designed for practically every reaming operation. The line is extremely large and adaptable.

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Biggest Success in the Ford Lining Field



A world's record! That's what Cork Insert made when it won a place on hundreds of thousands of Fords within a few short months. It broke all selling records because it gave a better performance than anything else ever produced—*smoother action—a safer brake—and longer wear.*

Don't forget that it is *merit* that has put Cork Insert over. There is no magic in the name or qualities of Cork. It has wonderful frictional properties. But by itself, it is utterly valueless as lining material.

The secret of Cork Insert Service and its success is the Cork Insert Way of combining cork and lining. It's a patented way. No other lining does the work equally well.

So look out for the imitations. They haven't the big combination idea that makes Cork Insert a success. It is easy to get Cork Insert. Most dealers sell it — any garageman will install it. Either can get it in a few hours, for all jobbers sell it.

Advance Automobile Accessories Corp.

Dept. M5-1, 56 East Randolph Street, CHICAGO



$3 per Set of 3

Rockies West, $3.25—Canadian Price, $4.50



$1
for 1917-18 Fords
85c for 1916 and earlier Fords

Canandian Prices: 1917-18 model, $1.50; earlier models $1.25

Smooth Action, Sure Brake, Long Wear

—that's the service that Cork Insert Transmission Lining gives. When you apply the brake, the corks hit the brake drum first. They compress gradually and ease the load down to the fabric. The light pressure required, and velvety smooth action of the buttons of cork coming in contact with the drums, means such long wear that Cork Inserts are far the cheapest in the long run.

Keeps the Ford Fan Fanning

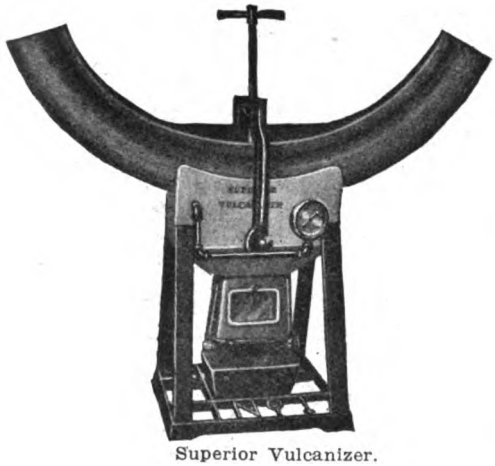
Retards overheating. Most motor trouble is caused from overheating. This is due in no little degree to loss of driving power—estimated as high as 25% to 50%—because ordinary fan belts slip and stretch. Cork Insert Fan Belts stop the slipping. It doesn't have to be run light to prevent slipping, like ordinary belts. This, plus its durable construction, means extra long wear and economy. Cork Insert Fan Belts outlast all others—hence economical.

CORK INSERT

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Superior Vulcanizer.

Anyone who is contemplating the repair of automobile tires should investigate the line of vulcanizers which are being sold by the Superior Vulcanizer Co., 16-A



Superior Vulcanizer.

Fulton Ave., Rochester, New York. Our readers should send for catalogue and price list.

Oxigene.

At the fuel tests inaugurated by the New York Herald and held on Oct. 2nd, 3rd and 4th, at Sheepshead Bay, it was successfully proven that by the addition of a liquid to gasoline, the mileage obtainable from the gasoline could be increased at least 50 per cent and in some cases even more.

The liquid which made this remarkable showing is sold by the Miller Chemicals, Inc., 350 W. 26th St., New York City. Although many extremely satisfactory private tests had been made with Oxigene, its great practical value was demonstrated fully at that time. In addition to the increased mileage obtainable, it was demonstrated that Oxigene prevented the formation of carbon in the cylinders.

The manufacturers of Oxigene claim that there is no danger of chemical action with this product. When used according to directions the results are remarkable.

Small Tools Catalogue No. 40.

The Greenfield Tap & Die Corporation of Greenfield, Mass., have just issued their catalogue No. 40 of small tools, taps, dies, screw plates and reamers. The booklet is considerable more than a catalogue, and deserves special mention because it contains so much useful information relative to machine work in this particular field.

A great number of pages are devoted to tables and useful information. Every garage owner should have this book for the very reason that it gives so many suggestions as to equipment. The repairman does not realize how cheaply he can purchase tools until he has consulted this catalogue.

Hotel Winton Books Many Cleveland Conventions.

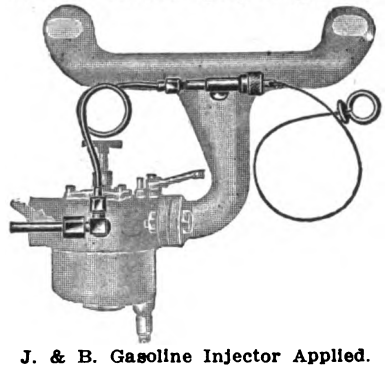
Of the large number of conventions scheduled for Cleveland during the month of November, the Hotel Winton had 75 per cent on its books.

The preference of this hotel by the majority of committees, who chose Cleveland and its advantages, has attracted no little attention throughout the country. It was a popularity due, no doubt, to the facilities offered by the new, beautiful and spacious Hotel Winton.

The comfortable, home-like rooms, the preparations that had been made for the visitors, the exceptional service rendered, the convenient location of the hotel, the arrangements laid out for an expedient conduct of all convention business, and the rainbow room with its ice carnival and bevy of ice stars, were commented upon time and time again by the various committees.

J. & B. Gasoline Injector.

During the winter weather gasoline will not vaporize readily, consequently an owner may figuratively "crank his head off" without getting a single explosion from his cold engine. There is one way to start an engine, however, and that is to prime it; to force a spray of gasoline into



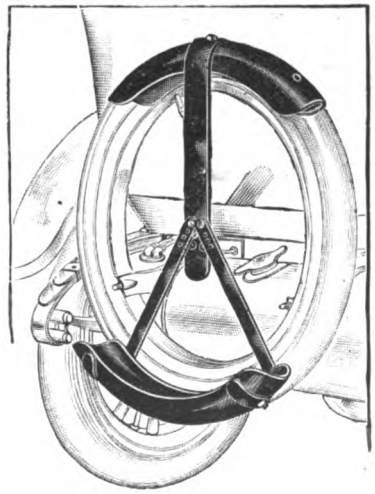
J. & B. Gasoline Injector Applied.

the manifold near the cylinders right where the spray is necessary.

Such a device is manufactured by the J. & B. Manufacturing Co., Pittsfield, Mass., and called the "J. & B. Gasoline Injector." This device is very easily installed. But one hole has to be driven in the manifold and the installation is practically complete. With it, gasoline is pumped from the supply line and injected into the valve ports. A small ring projects through the radiator and serves to operate the injector.

Adjustable Tire Carriers.

The International Stamping Co., 400 N. Leavitt St., Chicago, Ill., market a product which is well worth investigating. These devices are known as "Adjustable



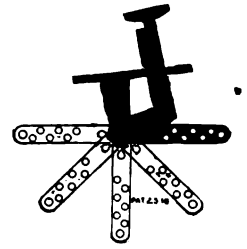
Adjustable Tire Carriers.

Tire Carriers." They are so designed that practically any number of tires within reason may be supported at the rear of an automobile. The first tire is clamped in the usual method to the back of the car and fastened firmly in place, then one of the adjustable tire carriers is hung upon this first tire.

At the lower edge of this carrier is a steel casing which supports the second tire. The second tire is strapped into place and supported at the top or sides and a third adjustable tire carrier slipped over the second tire. The illustration clearly shows how the device is applied.

Petry Universal Pedal.

The car owner or garageman who is called upon to install a muffler cut-out of any style or size, an accelerator, an exhaust whistle, horn or heater valve should investigate the universal pedal sold by the N. A. Petry Co., Inc., 1313 Race St., Phil-



Petry Universal Pedal.

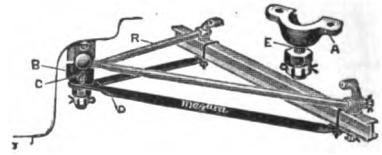
adelphia, Pa. The feature of this device is its adjustable arm.

The arm can be placed in practically any position so that the pedal can be adapted to the floor board or toe board or even the dashboard of any automobile. The illustration given herewith shows a number of the positions. When locked in any position the lever is adjustable to pull or push any device.

Mazura Auxiliary Radius Rod.

Many Ford drivers have often wondered why their cars could not be steered easily. They may have compared their own cars with some other machines and found that their cars suffered by comparison. In many cases the reason for this trouble can be traced to a bent radius rod.

Once a radius rod is bent, the car becomes very difficult to steer. Should it be broken when the car is in motion, control of the steering may be lost altogether, thus endangering both life and property.



Mazura Auxiliary Radius Rod Applied.

This may happen at any time, and in most peculiar circumstances. Should the car strike a stone or drop into a rut, there is danger of bending the present Ford 'wishbone" as it is often called.

To protect the radius rod, the Mazura Auxiliary Radius Rod has been designed by the Mazura Mfg. Co., 412-14 South Sixth St., St. Louis, Mo. This device is made in three different types. "T" Bar Steel, Angle Bar Steel and Tubular Steel, and is attached to the lower part of the front axle.

In place of the radius rod ball fitting cap, beneath the transmission, a new cap is furnished which carries a heavy stud upon which is fitted the auxiliary radius rod. Since the device is fastened to the lower portion of the axle, it absorbs many of the strains which might otherwise break the regular rod and cause an accident.

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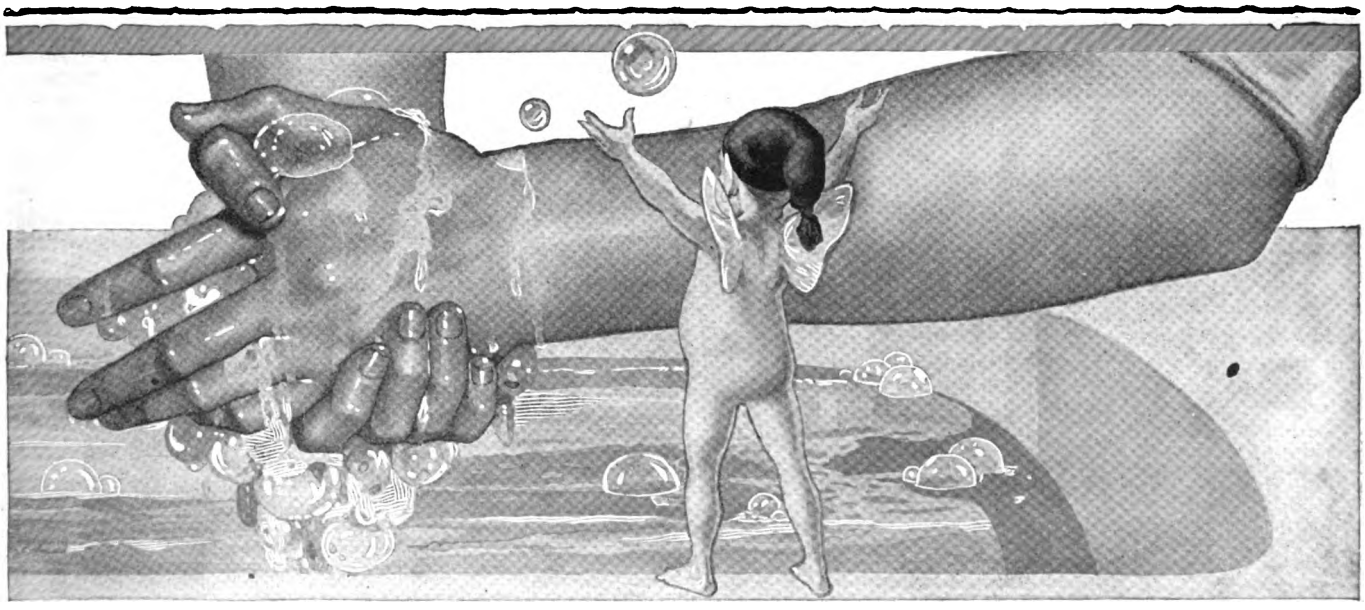
THE free creamy lather of Goblin Soap makes "cleaning up" easy for grownups and a delight for children.

The most obstinate grease and stains yield readily to Goblin Soap, and the hands and face have a soft, smooth and healthy feeling afterwards.

Fine for kitchen or workshop; office or home. Wherever you need good soap.

If your dealer does not have Goblin Soap, please send us his name and we will see that you are promptly supplied.

CUDAHY, 111 W. Monroe St., CHICAGO
64 Macauley Ave., Toronto, Canada



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Eccolene.

Present day gasoline, as everyone knows, is practically kerosene. Now, kerosene contains more heat units or more power than gasoline, if we can only use it in the engine. Kerosene is derived from the same base as gasoline, but some of the volatile elements have been removed in the process of distillation.

If we can but replace these elements, we can easily change the kerosene into gasoline, and have a fuel that possesses both power and low vaporizing point. In marketing Eccolene, the distributors, Edward A. Cassidy Co., 280 Madison Ave., New York City, claim to have solved the problem. They claim that Eccolene adds to the explosive force of present-day gasoline.



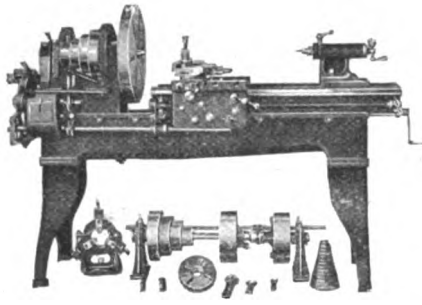
A Can of Eccolene.

They claim that when Eccolene is mixed with present-day gasoline, the resulting vapor is more thoroughly combustible in the cylinders, therefore it follows that less carbon will be formed. To a certain extent Eccolene may be said to be a carbon remover. With a clean engine more mileage is obtainable and the engine output of power is increased considerably. Our readers are requested to try this product.

Extension Gap Lathe.

Unquestionably the most important machine in any repair shop or garage is a lathe. A repairman cannot do good work unless the lathe is of the best.

Our readers who intend to operate a shop of any size should investigate the line of lathes manufactured by the Barnes Drill Co., 814-830 Chestnut St., Rockford, Ill. Their extension gap lathe is a particularly good proposition.



Extension Gap Lathe.

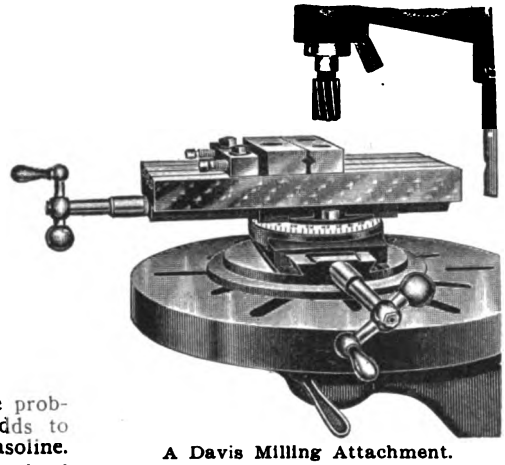
For the benefit of our readers who do not understand this device, we will say that such a lathe has a sliding bed which may be pulled back to admit a large diameter piece of work.

Our illustration shows the movable bed and a large face-plate on the machine. When turning small work the bed is pushed against the head. The lathes manufactured by this concern are of the best quality materials. No expense is spared in fitting them and the design is modern. The Barnes Drill Co. also manufacture different types of milling and taper attachments as well as lathe tools. Any one interested should write for literature.

Davis Milling Attachment.

The garage owner or repairman who owns a drill press should investigate the Davis milling attachment sold by the Hinckley Machine Co., Hinckley, Ill., and illustrated herewith.

This device can be used for cutting key seats straight or taper, for milling deep grooves or slots, for re-facing small pieces and for cutting Woodruff or half-moon key seats. The device is fitted with a circular base 12½ inches in diameter. It has a cross slide movement of 7 inches, a longitudinal movement of 12 inches. The vise jaws open 10 inches.



A Davis Milling Attachment.

The attachment is strong and well made. The bearings are scraped and the screws run in bronze nuts. The revolving table is divided into degrees. Our readers are requested to write for catalogue and descriptive matter.

Little Giant Starter.

Very frequently we receive requests from our readers for details concerning Ford starting systems. A mechanical starter has just been placed on the market by the Little Giant Starter Co., of Canton, Ohio, which should be of interest to our readers.

The Little Giant as it is termed, consists of an ingenious combination of ratchets, a chain and a long pedal. It is so arranged that one pressure of the foot upon the lever turns the engine over half a turn, but the action is extremely rapid, and has the effect of spinning the engine. Should the engine backfire, the starter releases automatically.

Everyone knows that it is much easier to operate a lever with the foot than it is possible to crank an engine. With the starting outfit is furnished a primer to facilitate starting. Any ordinary mechanic can attach it in a short time, and the old hand crank is left on the car for use in an emergency.

The Hele-Shaw Clutch.

An old repairman was once heard to say that though he had done a great deal of repair work on clutches, he hardly knew what the inside of a Hele-Shaw clutch looked like, simply because they were always in condition and usually lasted longer than the car did.

The Hele-Shaw clutch, sold by the Merchant & Evans Co., 2019-2035 Washington Ave., Philadelphia, Pa., is made of phosphor bronze and cold rolled steel. The discs present great frictional area for their size for they are fi ed with "V" grooves which increase the frictional area. The outer plates of phosphor bronze are driven by the engine and fit into grooves in the inner surface of the housing. The inner plates of steel drive the clutch shaft.

The whole assembly is enclosed in an oil-tight housing which carries the lubricant. It is claimed that this clutch is extremely flexible; that it does not slip, and that its action is smooth in starting. The clutch assembly may be applied to practically any type of power machinery, as well as automobiles.



A Hele-Shaw Clutch.

Our readers who are interested in this device should write to the manufacturers for their descriptive booklet. This company also manufactures a line of universal joints.

Universal Battery Clips.

The storage battery man realizes that considerable time is taken by removing battery terminals and connecting the wires with the battery. Time is money, no matter in what industry time is consumed.



A Universal Battery Clip.

To solve this little battery problem, R. S. Mueller & Co., 435 High Ave., Cleveland, Ohio, have manufactured a universal battery clip. This clip has a spread of jaws of 1½ inch, is made of extra heavy stock, and lead plated to resist corrosion.

The clip should be clamped or soldered to the connecting cords from the charging board and when a battery is to be charged the clip is snapped upon the terminals. The jaws of the clip are pointed so that it will not slip from the terminals. A heavy spring is incorporated which holds the jaws firmly against the connection.

The Mayhew Curtain.

The Sutter-Mayhew Co. of 174 Canfield Ave., West, Detroit, Mich., are marketing an adjustable curtain to be used in front of the radiators of popular cars. The old method of placing a piece of pasteboard in front of the radiator during the winter to cut off the air, is at best a makeshift, and a car that has a piece of pasteboard in front of the radiator presents an appearance somewhat similar to a window which has been repaired by stuffing newspaper in it.

The Mayhew adjustable curtain consists of a specially designed roller fitted to the lower part of the radiator. Upon this roller is wound the curtain and connecting

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NEW BOOKS RECEIVED.

The A B C of Aviation: The author of this book, Capt. Victor W. Pagé, is well known. He has for a number of months been the Chief Engineer Officer of the Signal Corps Aviation School, Hazelhurst Field, Mineola, L. I., and is fully competent to write upon subjects pertaining to aviation. Our readers will recall that Capt. Pagé has written a number of automobile books, and is a competent automobile engineer. His book upon aviation is complete and gives the detailed construction of practically all the machines in use. Every student of aviation surely should investigate this book which is published by the Norman W. Henley Co., 2 West 45th Street, New York City. The price of this book is $2.50.

The Sister of a Certain Soldier: We are in receipt of this book written by Stephen J. Maher which deals with one phase of the war situation. The story has an appealing interest, and is cleverly told. This book sells for 25 cents and is published by the Tuttle, Morehouse & Taylor Co., of New Haven, Conn.

The Successful Salesman: Our readers will remember the interesting series of advertising articles which have appeared from time to time in this magazine, written by Frank Farrington. We expect to publish more of these articles. Mr. Farrington is now in Y. M. C. A. work, and has recently written a book entitled "The Successful Salesman." This book is written in Mr. Farrington's bright style, and only those who have had the pleasure of reading his series can realize how many practical suggestions relative to advertising and salesmanship Mr. Farrington can give. The book is published by Laird & Lee, Inc., 1732 Michigan Avenue, Chicago, Ill., and sells for $1.

Practical Hints on Vulcanizing: The Auto Tire Equipment Co., of 326 East 8th Street, Cincinnati, Ohio, recently forwarded us their illustrated booklet relative to vulcanizing tires. This booklet contains many good suggestions relative to this branch of the work, and should be had by everyone who does this kind of work.

(Editor's Note.—The publishers of the Automobile Dealer and Repairer will furnish at the published price any of the books which are mentioned from time to time in this magazine.)

If you like this magazine and feel that it is useful and interesting, the *one best way* to show your appreciation, is to purchase your accessories and supplies so far as possible from our advertisers. Also write to our advertisers for catalogs, printed matter and prices, not forgetting to always mention the fact that you saw the advertisement in the Automobile Dealer and Repairer.

"YANKEE" Ratchet
Multiplies Man's Power



These "YANKEE" Ratchet Screw-drivers actually take the place of your muscles and effort in the alternating "grip and let go" action necessary to drive a screw.

You grasp the handle—once. Turn to and fro and the "YANKEE" Ratchet does the rest. It grips on the forward turn and releases on the back turn better than your hand can possibly do it with a common screw-driver.

To *draw* the screw, reverse the Ratchet adjustment with your finger tip. The Ratchet then moves backward, and out comes the screw.

With the "YANKEE" you keep a continuous pressure on the blade in the slot and a steady grasp on the handle. No excuse for "losing the slot."

"YANKEE" Ratchet Screw-drivers give you three adjustments: Right-hand for driving, Left-hand for drawing, or Rigid. All done with your finger tip. Real savers of time and tire. Polished steel blades, nickeled bodies, polished hardwood handles.

"YANKEE"
Ratchet Screw-drivers

	No. 10	No. 15
2 in. Blade	50c	55c
3 in, "	60c	60c
4 in. "	70c	65c
5 in. "	80c	70c
6 in. "	90c	75c
8 in. "	$1.00	80c
10 in. "	$1.20	
12 in. "	$1.30	

No. 15 has the handy Knurled Washer for starting wobbly screws with thumb and forefinger, while hand steadies the driver. Diameter of blade, 3-16 inch.

Write for this free "YANKEE" Tool Book of improved screw-driving, wood-boring and metal-drilling and tapping tools.

Your Dealer Can Supply You

NORTH BROS. MFG. CO.
Philadelphia

"YANKEE" TOOLS
Make Better Mechanics

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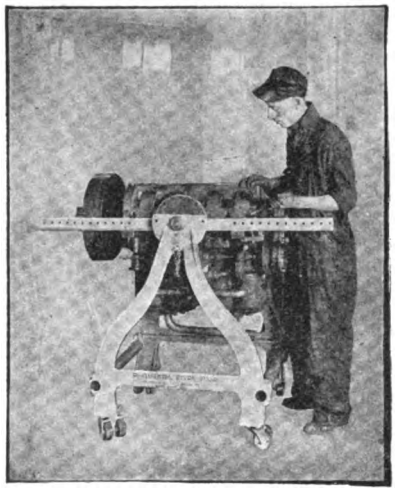
with the curtain is a length of cord. The cord passes through a joint at the top of the radiator and back to the dashboard.

Without leaving his seat, the driver can pull the curtain partially over the front of the radiator or entirely over it. In this way he can control the temperature of the engine at all times. The device in no way detracts from the appearance of the car, in fact it may be said to add to it.

Continental Motor Stand.

In this issue one of our contributors speaks of garage and repair shop equipment, and mentions, in particular, a portable engine stand. Undoubtedly such a device is of infinite value to the repairman.

The Continental Auto Parts Co., Knightstown, Ind., manufacture a stand which is adaptable to all types of engines. This stand consists of two heavy "A"



Continental Motor Stand.

frames which are adjustable toward or away from each other. Supported to the top of these frames by pivots is a small stand which in turn is fitted with a cross member for the three-point suspension type of engine. This cross member is removable and the frame is so arranged that any width or size of engine can be mounted upon it.

With but little effort the engine can be tipped to any angle for repairs or turned upside down if necessary for repairs to the crankshaft main bearings or connecting rods. Heavy castors are fitted to the bottom of the stand so that the engine may be wheeled to any part of the shop for machine repairs. The stand is flexible and adaptable to many kinds of work.

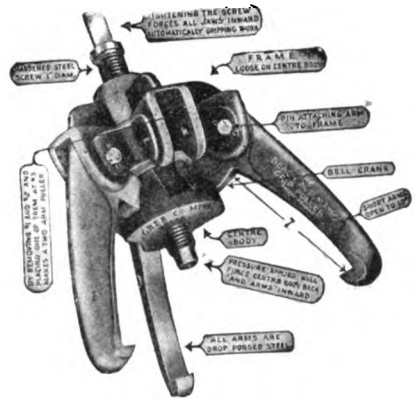
New Sales Manager.

Mr. Homer Hilton, for some time an advertising man upon the staff of the Class Journal Co., and the Automobile Trade Directory, and later with the western office of the Cosmopolitan Magazine, recently accepted the position of sales manager with the Oshkosh Motor Truck Co.

Beach Automatic Grip Puller.

The old sledge hammer method of removing fly wheels, gears and pulleys has long since passed into the discard. The modern garageman knows that an automobile can be ruined by the careless use of a hammer, and therefore he equips his shop with some sort of a wheel and gear puller.

The Greb Co., 172 State St., Boston, Mass., call the attention of the trade to the Beach Automatic grip puller, an ex-



Beach Automatic Grip Puller.

ceptionally efficient and durable tool. The device is different from all others on the market, in that the more pressure exerted by the tool, the tighter the jaws will cling.

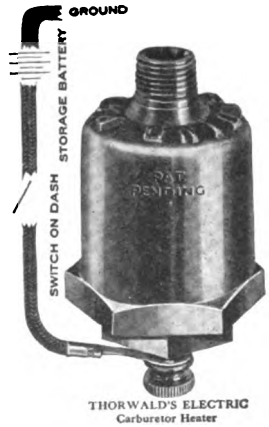
The center body of the device is slotted at four points, while the large seven-inch jaws have projecting fins, termed bell-cranks, which fit into the slots. When pressure is applied to the steel screw at the center, the center body slides in the frame and automatically grips the jaws tighter against the work. The arms are made of drop forged steel and held in place by pins and cotter pins. It can be used with either two or three jaws and can be adapted to practically any kind of work.

The center body is so arranged that it may be locked into position by a special lever. In addition to the small seven-inch arms, three long arms are furnished which measure twelve inches from the bell crank or projecting fins to the hooks at the ends.

A special puller designed upon the same lines can be had in a smaller size for magneto or other small work. Every garageman should investigate this valuable tool.

Thorwald Electric Heater.

In every mail we receive letters from our subscribers telling of the difficulty



Thorwald Electric Heater.

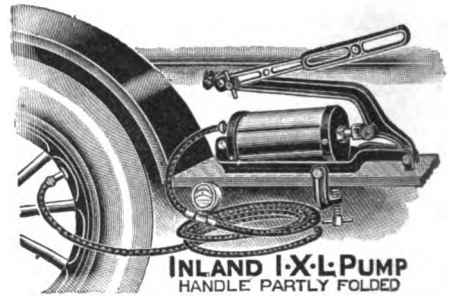
they encounter in starting their engines. We usually reply by telling them that some sort of a heater, or primer, is necessary. It is the only answer to the question. Gasoline must be vaporized before the engine can be started and heat is the one thing that is necessary.

To furnish this heat at the right point has been the problem of many manufacturers, and the Thorwald Mfg. & Sales Co., 1307 Jackson St., Omaha, Neb., market a little device which would seem to be the solution of the problem. This device is known as the Thorwald electric carburetor heater. It is a little electric unit which is designed to be attached through a switch on the dash to a storage battery.

When the switch is turned on, current passes through the heater, and the resistance to the current develops heat. The device can be attached to the carburetor or intake manifold and serves as a small hot spot which will vaporize the gasoline.

Inland I-X-L Pump.

Motorists who are interested in tire pumps should investigate the Inland I-X-L pump, manufactured by the Inland Pump Mfg. Co., 609-12 Reaper Block, Chicago, Ill. This pump is said to develop a lever-



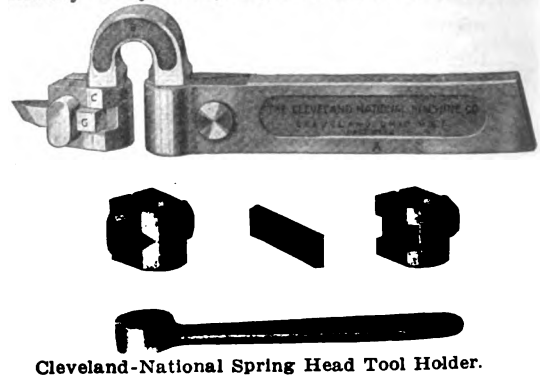
Inland I-X-L Pump.

age 18 times greater than the ordinary foot pump, and can be operated very easily. The cylinder is made of seamless drawn steel tubing. It is furnished complete with hose and gauge if desired.

Spring Head Tool Holder.

Illustrated herewith is a special tool holder manufactured by the Cleveland-National Machine Co. of Cleveland, Ohio. This tool holder is designed especially for finishing work. The spring head is said to relieve chatter and give a perfectly smooth cut.

One feature of the head is its adaptability to any angle of work. It is mounted



Cleveland-National Spring Head Tool Holder.

upon pivots and can be swung to any angle up to 90°.

Tool clamps are furnished in a number of sizes and are interchangeable. They are arranged so that they can be inverted and the tool used at either side of the holder. Parting tools as thin as .014 can be used with success. At the present time the above company are making a 30-day trial order. Our repair shop readers should write for illustrated literature and special offer.

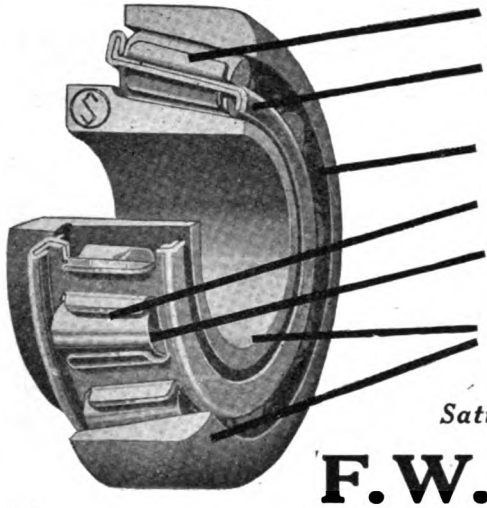
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F.W.S. ROLLER BEARINGS

for FORD and CHEVROLET FRONT WHEELS

F. W. S. IMPROVED RETAINER

(Patent applied for)



(1) **BROADWINGS OF CAGE** provide broad and smooth surface against rollers, so rollers cannot get out of line

(2) **STRONG CAGE** is secured by double walls of high carbon steel, outer edge reinforced by turned edge, giving three thicknesses at that point.

(3) **DIRT PROOF:** Large diameter rollers and open cage prevent accumulation of dirt and avoid friction

(4) **MINIMUM FRICTION:** Large roilers minimize friction and wear, practically eliminating breakage.

(5) **LUBRICATION:** The wings provide pockets to retain the grease, but accumulated dirt cannot pack in around the rollers

(6) **CONES AND RINGS** made of especially prepared steel properly tempered and ground to absolute accuracy in size and contour

Satisfaction guaranteed.

F. W. STEWART

1404 Michigan Ave., CHICAGO

DEALERS AND GARAGEMEN:
Write for Further Particulars.

Improved Repair Shop Efficiency.

The imminent need of a light portable power-driven device to replace the screwdriver or brace for valve grinding in the repair departments of progressive garages has come to be indispensable owing to the increase in valves in the motor construction of today and the shortage of labor.

Manufacturers have been quick to realize the great field for such a device and as a result several devices have made their appearance on the market within a comparatively short time.

In solving this problem for the repairman, the manufacturer has had to confine himself to the peculiar sensitive nature of the work. A tool that would be severe on the most vital part of the motor would be useless.

To begin with, a rotary motion is out of the question, as it would score the valves on high speed, so the universal conclusion seemed to be a duplication of the same motion now used in hand valve grinding, namely, an oscillating motion with a considerably reduced stroke. Excessive weight was another point to be overcome as the tool should not be tiresome to hold in the operator's hand at the same time a minimum pressure on the valve is desirable although a spring used under the valve head relieves considerable direct weight.

It also became necessary to develop the gentlest oscillating motion possible in order to reduce vibration, thus insuring a longer endurance for the tool, at the same time avoiding chatter at the point of grinding.

Of course it was inevitable that the wonderful resourcefulness and ingenuity of our American manufacturers would soon develop a successful portable electric valve grinder that saves at least two-thirds of the time now necessary to do the same work by hand besides doing it easier and really better. Who will deny the more uniform results obtained by the elimination as far as possible of the human element?

A new and notable achievement in this line has been the accomplishments of the Petterson Engineering & Mfg. Co., of Worcester, Mass., who made a deep study of valve grinding requirements. They feature a combination electric drill and valve grinder. This device is capable of drilling holes up to one-quarter inch in diameter, also grinds valves, neither operation interfering with the other in the slightest degree—the extraordinary simplicity of this device is the chief claim made by the Petterson Engineering & Mfg. Co., as evidence of its durability.

Substantially housed, pack hardened steel gears, forced and keyed to shafts throughout, ideal lubrication system and split casing, affording accessibility to the interior whenever necessary are also noteworthy.

Mr. Charles L. Jernberg, formerly connected with the B. F. S. Manufacturing Company, originally suggested as possible the combination electric drill and valve grinder and an improved valve grinder to Mr. Petterson and Mr. Werme, well-known engineers, with the result that within five months these gentlemen developed the suggestion and are now associated together with Mr. J. H. Lindberg in the manufacture of combination electric drill and valve grinders, electric valve grinders and drills under the trade name "Bilt-Rite," with office and engineering address, 311 Main St.; factory, 54 Hermon St., Worcester, Mass.

Heintz Vulcanizer.

Undoubtedly the next few years will see an unprecedented increase in tire repairing, brought about by the increase in the cost of crude rubber. Therefore there will be a great number of tire repairing shops springing up throughout the country. Necessarily there will be a call for vulcanizing apparatus.

Everyone who is intending to go into this business should investigate the product of Jas. C. Heintz & Co., 2069 E. 9th St., Cleveland, Ohio. This machine is designed for connection with a 110 volt lighting current. The electric current furnishes the heat to vaporize the water. In the smaller size of machine, one pint of water is used, while one quart of water is used in the larger size.



Heintz Vulcanizer.

The capacity of the small size is practically 18 tubes per hour, while the capacity of the larger size is practically 24 tubes per hour. Such is the design of the machine that the steam pressure is controlled at all times by a patented automatic pressure control.

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Under this head will be printed advertisements of **Second Hand Cars Wanted or for Sale, Accessories of any kind Wanted or for Sale, Shops for Sale or Rent, Situations or Help Wanted, Second Hand Tools or Machines for Sale or to Exchange,** at the uniform price of **five cents a word,** including the name and address, for each insertion, payable in advance. **No advertisement will be inserted for less than 75 cents, however small.** Remittances may be made in postage stamps or in any convenient way.

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Classified Advertisements

Address MOTOR VEHICLE PUBLISHING CO., 71-73 Murray Street, New York.

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M. LIBEN & CO.

205-A West 48th St. New York City

Exceptional Values
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DOUBLE CHAIN STITCHED TIRES

Size	Plain	Non-Skid	Size	Plain	Non-Skid
28x3	$4.50	$5.00	35x4	$10.00	$11.00
30x3	5.50	6.00	36x4	10.00	11.00
30x3½	6.50	7.75	34x4½	11.00	12.00
32x3½	8.00	9.00	35x4½	11.00	12.00
31x4	9.00	10.00	36x4½	11.00	12.00
32x4	9.00	10.00	37x4½	11.00	12.00
33x4	9.00	10.00	35x5	11.00	12.00
34x4	10.00	11.00	36x5	12.00	13.00
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37x4½	12.10	13.20	4.35
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PATENTS SECURED—C. L. Parker, Patent attorney, McGill Building, Washington, D. C. Inventor's Handbook upon request.

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The Alliance Controller.

The tire repairman who uses steam vulcanizers in which the steam is generated by gas, should be interested in a device which is being sold by the Alliance Controller Co., of Alliance, Ohio. Heretofore there has been danger of excessive steam pressures when gas has been used as a fuel. Should anything go wrong with the safety valve, or the gas burners, with the



The Alliance Controller.

excessive pressure, over-curing of the tire would result; consequently money would be lost.

The Alliance controller, however, takes care of and eliminates these dangers. It is designed for all types of gas-burning vulcanizing machines and can be attached in a few moments. It attaches to the gas line and connects with the steam chamber. When the pressure in the volcanizer reaches a pre-determined point, the gas is automatically shut off. The controller regulates the flame and holds the steam pressure at the desired point.

In starting the vulcanizer the controller permits a full flow of gas to the burner. The controller valve can be set at any time and requires no further attention, simply light the gas and the pressure will remain constant after steam has once been generated. One can see that the saving of gas had by this machine will soon pay for it.

U. S. Government Approval.

The British government at the beginning of the war tested out the truck built by the Four Wheel Drive Auto Co., Clintonville, Wis., and approved it for the heaviest duty performed at the front.

The United States government tested out the F. W. D. truck in the Mexican border campaign, and adopted it for use over the rough desert roads and trails of Texas and Mexico.

When the United States entered the world war the War Department adopted the F. W. D. as the standard truck for heavy ordnance transport, and orders were placed for many thousands of these machines for duty in France. They were built by the Four Wheel Drive Auto Co. of Clintonville, Wis., and their licensees—Premier Motor Corp., Indianapolis, Ind.; Mitchell Motors Co., Racine Wis.; Kissel Motor Co., Hartford, Wis.

The Evans Model "Hele-Shaw" Clutch and Evans Alignment Joint exclusively used in the F. W. D. equipment is manufactured exclusively by Merchants and Evans Company.

The United States Standardization Board, after exhaustive experiments and rigid tests, finally "standardized" U. S. government three-ton artillery tractors, which are of the four-wheel drive type, Model "T.T." and which specify exclusively the "Evans" Model "Hele-Shaw" Clutch. The concerns authorized to produce these tractors are the Militor Corporation of Jersey City and the Packard Motor Car Company of Detroit, who promptly contracted with the Merchants and Evans Co. for their clutch requirements.

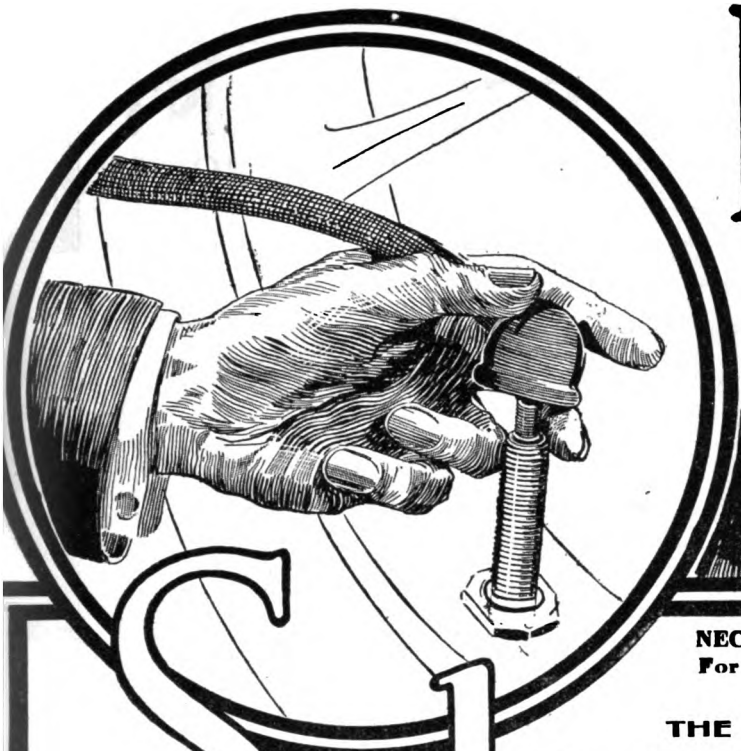
"Armored" Gasoline Locomotives are produced and furnished to the government in large quantities by the Baldwin Locomotive Works of Philadelphia and the George D. Whitcomb Company of Rochelle, Ill. All of these locomotives are equipped *exclusively with "Evans" Model "Hele-Shaw" Clutches.*

The U. S. Department of Agriculture, Bureau of Entomology and the Massachusetts State Board in their control work against moths are using Motor Spraying Apparatus (the only apparatus of its kind in the world). *The "Evans" Model "Hele-Shaw" Clutches and Evans Alignment Joints are exclusively used in these machines,* which are made by the Fitzhenry-Guptill Co. of East Cambridge, Mass.

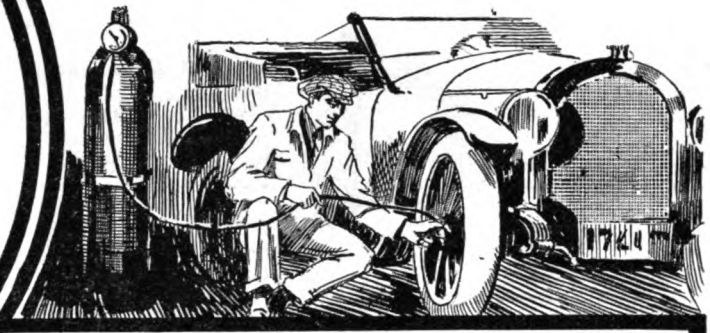
The unquestionable evidences of efficiency above presented should induce you to promptly call upon any of their offices for estimates of your clutch and joint requirements, with a statement of the work in which your trucks are at present engaged. Their illustrated clutch catalog is free for the asking.

"Evans" Universal Joints continue to be largely used for general motor car work. The "M. & E." Ratchet Top Grease Cups are produced and furnished in enormous quantities to a host of truck makers.

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It's New!



NECESSITY IS THE MOTHER OF INVENTION.
For a new disease there must be discovered a new remedy.

THE

Schrader

AUTOMATIC INFLATING VALVE

prevents EXOSMOSIS of the air-tank.

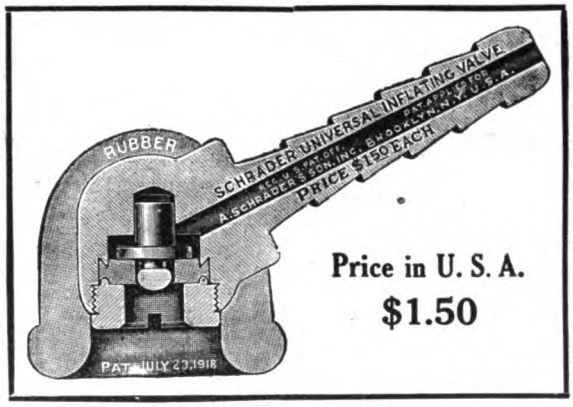
If you look it up you will find that EXOSMOSIS means the passage of gases through membranes or porous media from within outward.

The SCHRADER AUTOMATIC INFLATING VALVE prevents the passage of your costly compressed air from within your siphon or tank outward into space.

The customer for whom you have installed a "free air" station does not mean to do it, but he does forget to turn off the flow of air after he has inflated his tires at your "pump." The result is that some of your "free air" goes into tires but most of it escapes and is wasted.

We now offer you the means of preventing this waste. With a Schrader Automatic Inflating Valve at the end of your air hose the air supply is *automatically* shut off the minute you remove the appliance from the tire-valve.

It is protected by a thick covering of rubber so that it won't dent or scratch the enamel of the car.



Price in U. S. A.
$1.50

No Garage Can Afford To Be Without One.

At your dealer's, or

A. SCHRADER'S SON, 783-803 Atlantic Ave., Brooklyn, N. Y.

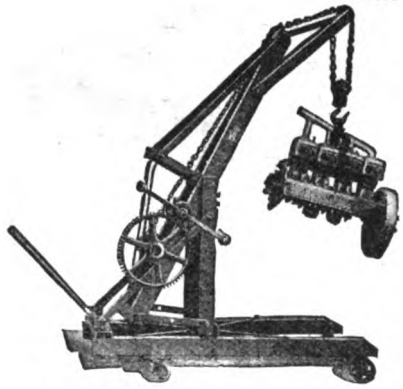
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MANLEY GARAGE EQUIPMENT

THE KEYNOTE TO EFFICIENCY AND INCREASED PROFITS

Manley General Utility Garage Crane

The Most Universal Garage Tool Ever Developed



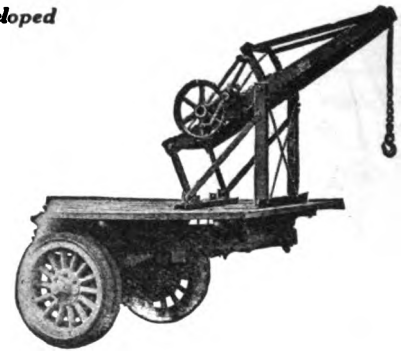
As a Portable Floor Crane for inside or outside uses
Capacity 1½ tons Price, $132.00

A half dozen different tools combined into one.

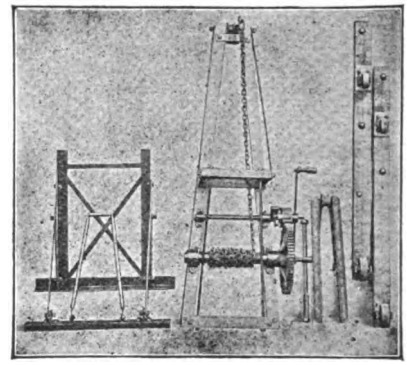
May be used for a hundred different purposes inside the Garage and outside in the country. May be mounted on a truck, chassis of service wagon for use as a general wrecking Crane.

Goes on and off a truck so easily and quickly it is not necessary to keep it tied up for this purpose only. If no truck is available, it may be taken apart and into the country to a wreck on a touring car.

It is taken down and put together again by two men in five minutes. Takes up no room when not in use.



As a Wrecking Crane Mounted on a Truck
Capacity 2 Tons Price, $112.00



May be used inside the Garage for every lifting operation and outside the Garage for wrecking purposes of all kinds. It therefore does double duty.

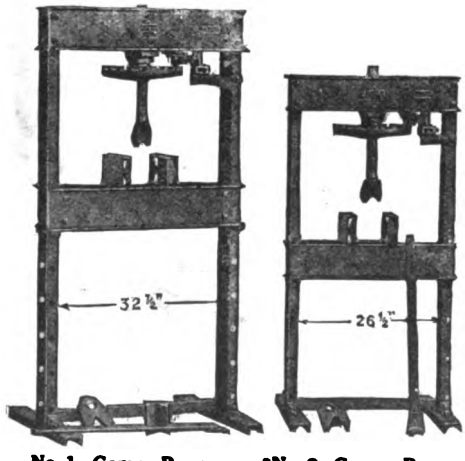
Any Garage using this Crane will get all the wrecking jobs. It will handle them as no other appliance can, five to ten times quicker. It is specialized for this work.

The biggest money making tool for the Garage on the market. Every operation performed by this Crane is one for which the Garage receives big money.

This Crane is constructed throughout of steel except the gearing which is cast iron and the base is seasoned white oak. It has four different leverages to suit all classes of work. The beam may also be tilted to any position from the horizontal to the vertical.

Lift as a floor crane 7 feet, overhang 36 inches, weight 485 lbs. Price, $132.00. Overhang as a wrecking crane 42 inches, weight 375 lbs. Price, $112.00.

MANLEY 22 TON PRESSES



No. 1 Garage Press Price, $98.00 *No. 2 Garage Press Price, $82.00

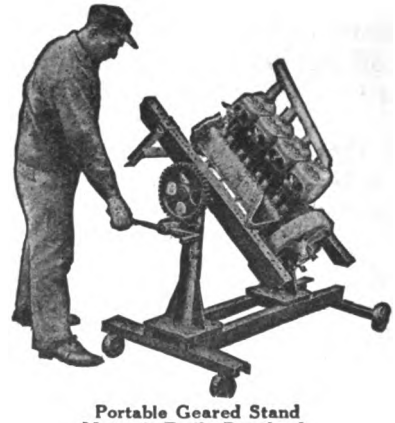
The Manley Line of Garage Presses consists of 4 different sizes making it possible for the Garageman to select a Press to exactly suit his class of work to the best advantage. These Presses have been highly developed and specialized for auto work and possess several exclusive features vitally necessary to handle this work to the best advantage in the shortest time and with the least effort. The two speed, quick change leverage is a tremendous advantage, the screw striking feature for extreme cases, the quick adjusting tables, the possibility to open the side bars to straighten chassis frames, the self-adjusting V Plate, etc., are also instantly appreciated by any Garage operator as real necessities.

MANLEY UNIVERSAL ENGINE STANDS

Plain Geared Stationary Portable

Large and Small

Ford Special Stand



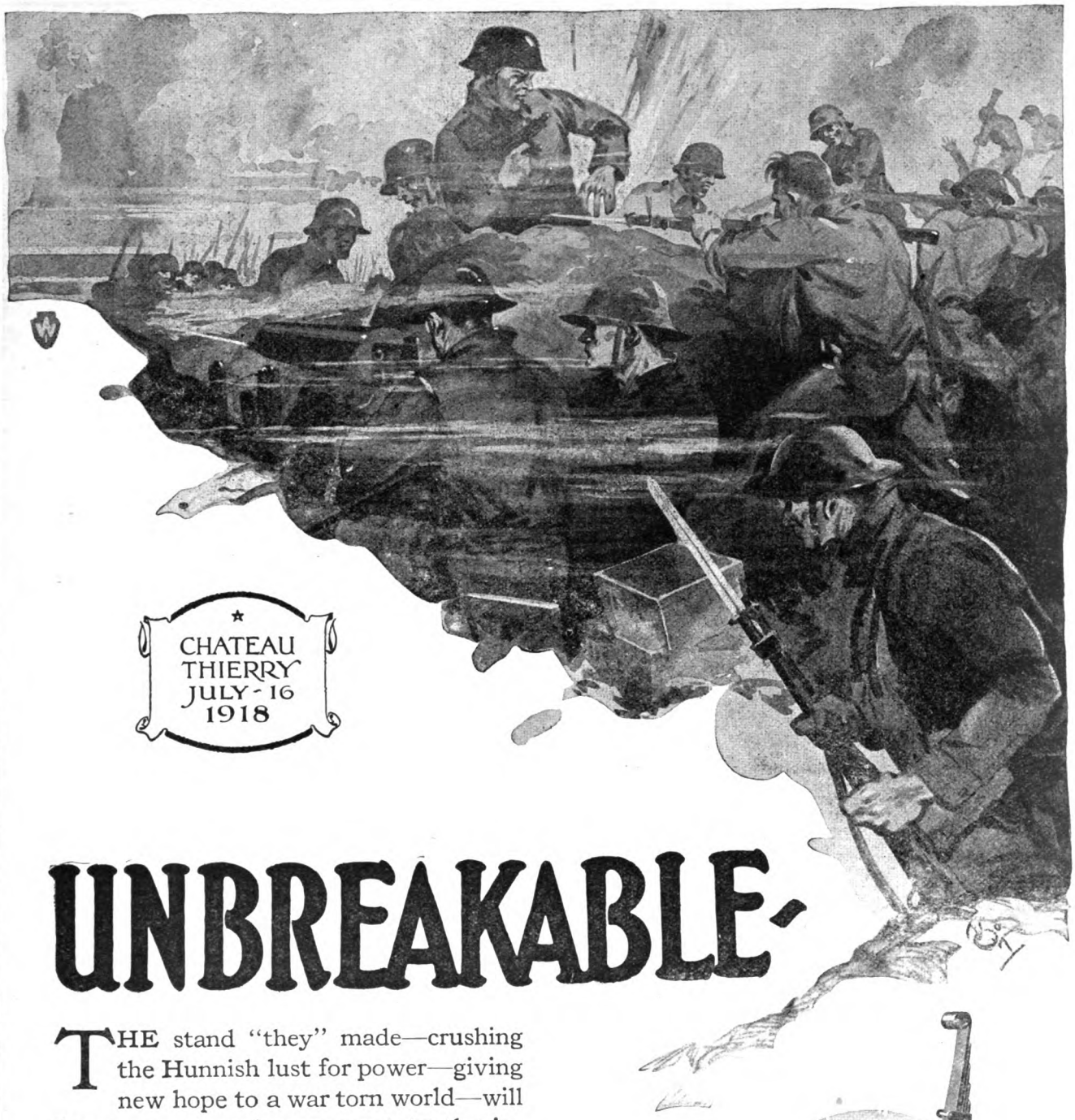
Portable Geared Stand
Motor is Easily Revolved

In Repairing Engines it is only reasonable that every facility should be given to the workman so that he can work to the best advantage by having the motor properly supported so that he can turn it to any position in order to work on the various parts with the greatest ease in a perfectly natural position without cramping, without stooping and without danger. This is what the Manley Engine Stands were designed to do and is what they do with the highest degree of efficiency.

Also Portable Floor Cranes, Portable Work Benches and Oil Services

UNITED ENGINE & MFG. CO. - - - - - - - Hanover, Pa.

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UNBREAKABLE-

THE stand "they" made—crushing the Hunnish lust for power—giving new hope to a war torn world—will live as an eternal monument to the indomitable spirit of American manhood. Their's the honor: sublime, imperishable.

Ours the satisfaction of knowing that somewhere behind the lines Government trucks equipped with Harvey Springs served them with supplies.

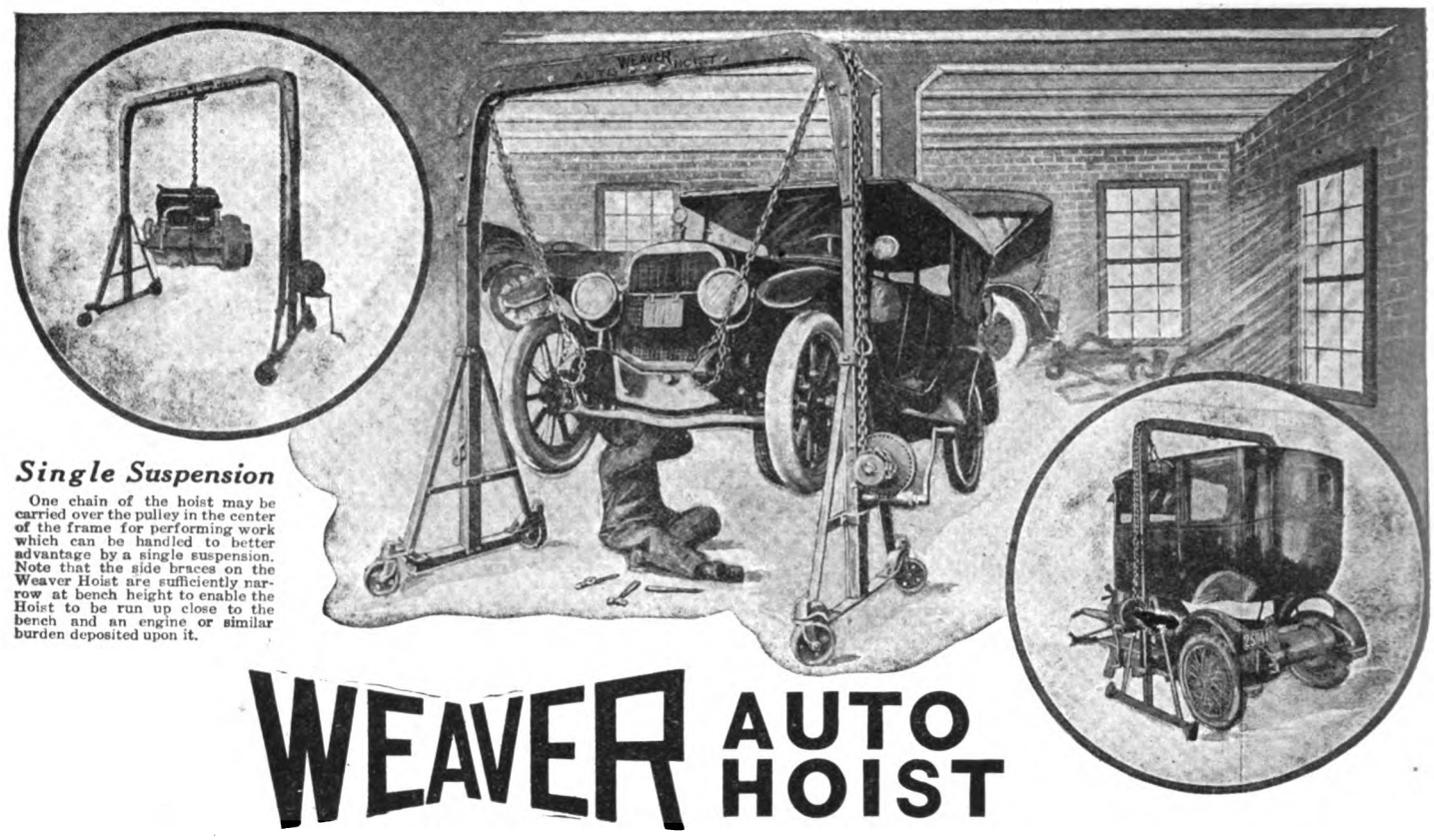
Send for latest Spring Book showing 1000 Automobile Springs.

HARVEY SPRING & FORGING CO.
921 17th Street RACINE, WIS.



PRACTICALLY UNBREAKABLE

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Single Suspension

One chain of the hoist may be carried over the pulley in the center of the frame for performing work which can be handled to better advantage by a single suspension. Note that the side braces on the Weaver Hoist are sufficiently narrow at bench height to enable the Hoist to be run up close to the bench and an engine or similar burden deposited upon it.

WEAVER AUTO HOIST

The WEAVER Auto Hoist is a combination block and tackle, crane, traveling hoist and derrick, with either single or double suspension, all in one. It is possible to place the hoist in position for any kind of repair work necessary on the motor car.

For Example:—Taking Out Rear Systems. Removing Car Bodies. Taking Out Front Axles. Removing Engines, Cylinder Blocks, Etc. Handling Transmissions or other heavy parts.

GARAGEMEN will instantly appreciate the saving this means in equipment, in time and in labor. It does away entirely with the dangerous and room-consuming pit. It eliminates the necessity for a crane. In the crowded shop it is especially adaptable because when not in use it can be run out of the way over a car, occupying practically no floor space at all. And in any shop it will quickly pay for itself time and time again.

The lifting mechanism of the WEAVER Auto Hoist provides a leverage of approximately 500 to 1, and allows for the lifting of the heaviest cars with very little effort.

The chains are tested to withstand a strain far in excess of any condition that may be met in actual service.

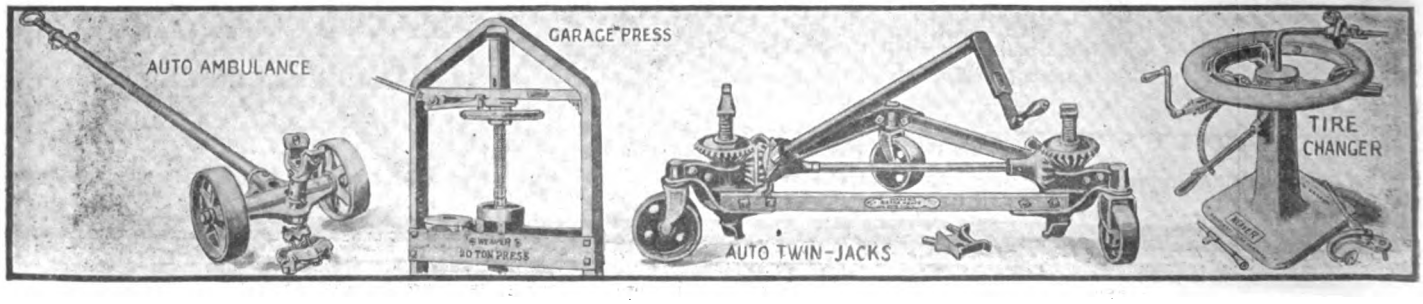
The frame is of 5-inch channel steel of great strength, and is telescopically constructed so that the arch may be raised twelve inches over normal heighth, thus permitting the raising of a high limousine for removing the rear system (see illustration in small circle on the right hand side of upper illustration.)

The hoisting mechanism is operated by worm drive which is absolutely safe and positive. There are no gears or ratchets to slip or break and so allow the load to fall.

Write For Complete Details

Let us send you, FREE, our catalog fully describing this and other WEAVER Shop Equipment. For years we have specialized on shop equipment, and unless you have studied our line of products you will never know *how efficiently your shop can be equipped.*

WEAVER MFG. COMPANY, -- 2175-79 S. 9th St., Springfield, Ills.



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HARNESSING the power of America for the vigorous prosecution of a Victorious War against the foes of Democracy has developed the greatest single force the world has ever known.

As small a part as the 100 per cent war production of our plants played in the vast program, it was one of the vital cogs in that Great Machine that has redeemed civilization.

American Hammered Piston Rings were chosen by Uncle Sam and our Allies for war motors. It was recognized that the exclusive American process of *Hammering in the quality* gave to the motor every atom of power that gasoline could generate, and assured the greatest possible degree of motor efficiency. Curtailed as our production for trade consumption has been, arrangements are rapidly being perfected to supply the demands of the manufacturer and the trade.

Correspondence Solicited

HAMMERED PISTON RING CO. OF AMERICA
NEWARK, N. J., U. S. A.



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With an Ewald Tire Retreader you can make as much as $25 Profit or more per day

New Improved Double Acting Plunger



One Tire Repairman Writes:

"I stapled 10 casings at $2.50 each, and more than paid for the **Ewald Tire Retreader** the first day."

You can do as well, for there is plenty of this profitable business everywhere. The present prices of tires make it necessary for every car owner to get the maximum service out of them.

Making one serviceable tire out of two badly worn casings is economy for the car owner, and profitable for the repairman.



OUTFIT INCLUDES

Retreading Machine.
250 Special Staples, ½ in. long.
250 Special Staples, ⅝ in. long.
250 Special Staples, ¾ in. long.
250 Special Staples, ⅞ in. long.
Full Sheet of Instructions.
1 Can Tire Cement.
1 Can Talcum.
1 Cement Brush.
1 Tracing Wheel.
1 Tire Spreader.
1 Trimming Knife.
2 Rolls Rubber Reliner.
1 Shipping Box.

Price, Complete as Shown, $20.00

Every garageman, repairman and tire repair shop needs it! This is your big chance for quick and substantial profits. Write today for particulars.

Factory Sales Deptartment

THE ZINKE COMPANY

1323 S. Michigan Ave., Chicago, U. S. A.

Manufacturers

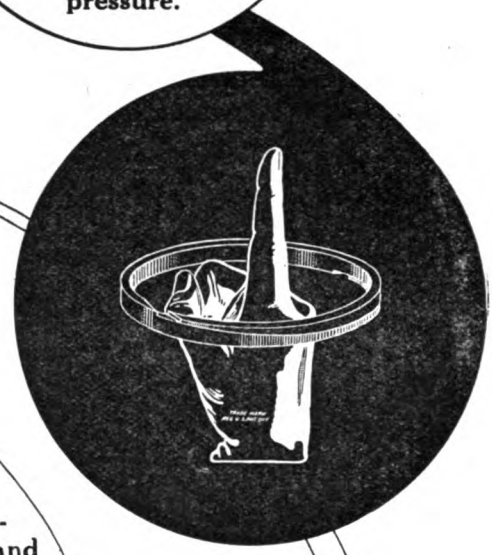
ROMORT MFG. COMPANY

Oakfield, Wis. — Chicago, Ill.

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The Inland patented Spiral Cut makes a mechanically perfect piston ring in *one piece.*

The Spiral Cut eliminates the gap and produces a ring that *uncoils* against the cylinder wall, making a perfect seal. Special treatment of free ends makes ring, *when compressed,* a perfect circle, preventing free ends pressure.



The uncoiling action of the Inland *takes up* wear on the cylinder so that perfectly *even* and perfectly gas-tight pressure is continually maintained.

The Spiral Cut also permits making a ring of equal width and thickness all around – no weak or thin places—the strongest and most durable construction.

Dealers: Inland sales are now on a basis of *millions* per annum. Are *you* selling Inlands? Jobbers everywhere stock them–ask yours.

INLAND MACHINE WORKS
1644 Locust Street
St. Louis, Mo.

INLAND

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Don't Fool With Poor Hand Warmers

Many dealers have been "stung" by taking inferior hand warmers that do not give satisfaction. They either used too much current or they burned out quickly, or they overheated, and had many other faults. Steer Warms are not in this class. Do not confuse them with inferior hand warmers.

SteerWarms

The Electric Hand Warmer That Gives Satisfaction

An electric device is not something to fool with. Unless it is put out by a reliable manufacturer there is apt to be trouble. Buy from a reliable manufacturer with capital enough to make good any guarantee and you will not be borrowing trouble. Steer Warms have been on the market for five years and will be here for years to come. You will find Steer Warms listed in the catalogs of all the leading jobbers. Remember that it requires only a small stock—only two types for dealers—making Steer Warms the biggest money making accessory you can handle.

The War is Over — Restrictions Relaxed

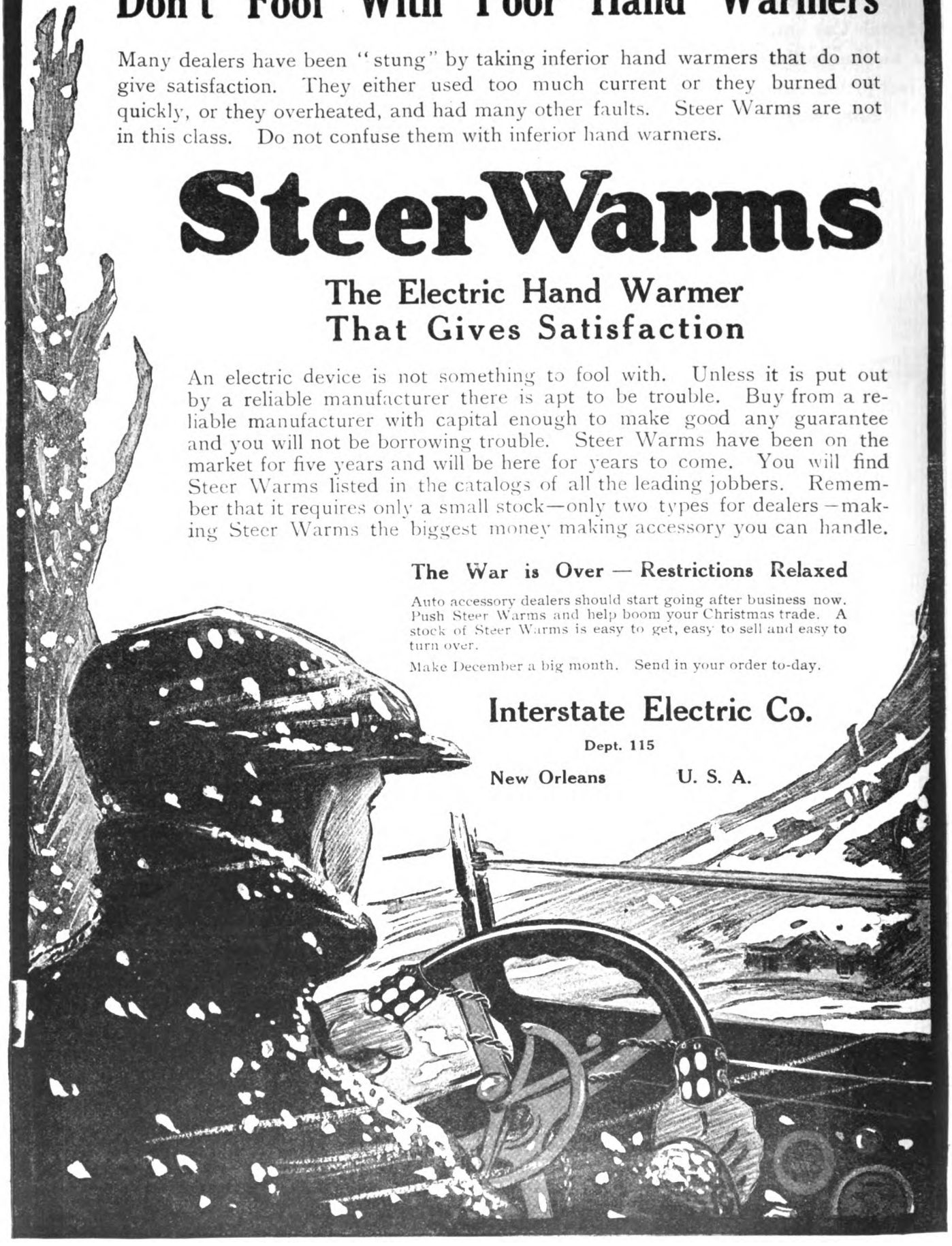
Auto accessory dealers should start going after business now. Push Steer Warms and help boom your Christmas trade. A stock of Steer Warms is easy to get, easy to sell and easy to turn over.

Make December a big month. Send in your order to-day.

Interstate Electric Co.

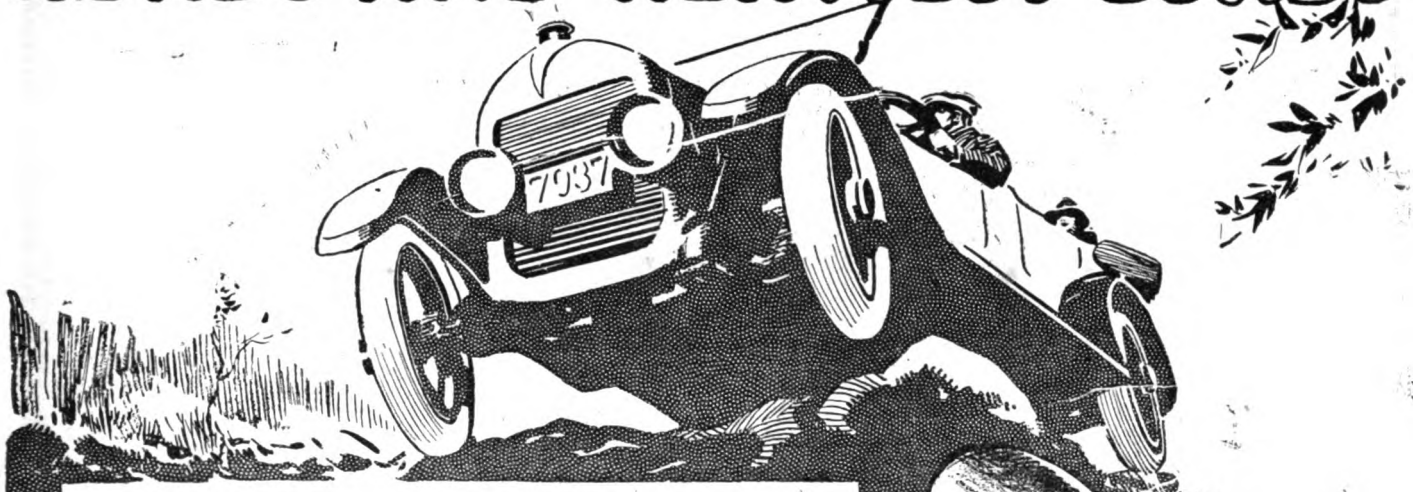
Dept. 115

New Orleans U. S. A.



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STAND THE "POUND" OF THE ROADS AND HEAVIEST LOADS



We Have Won

—won decisively—won gloriously. Business is going to be great. It will snap back into place as quickly as we adjusted ourselves to war-time conditions. Dealers should be prepared to supply tremendous demand for Replacement Springs.

Buyers are going to be keen—*quality* will be paramount in their needs. Supply it as you can with Higgins Springs. No center hole—no center hump—non-breakage springs that serve with greatest safety and economy. Garner the profits.

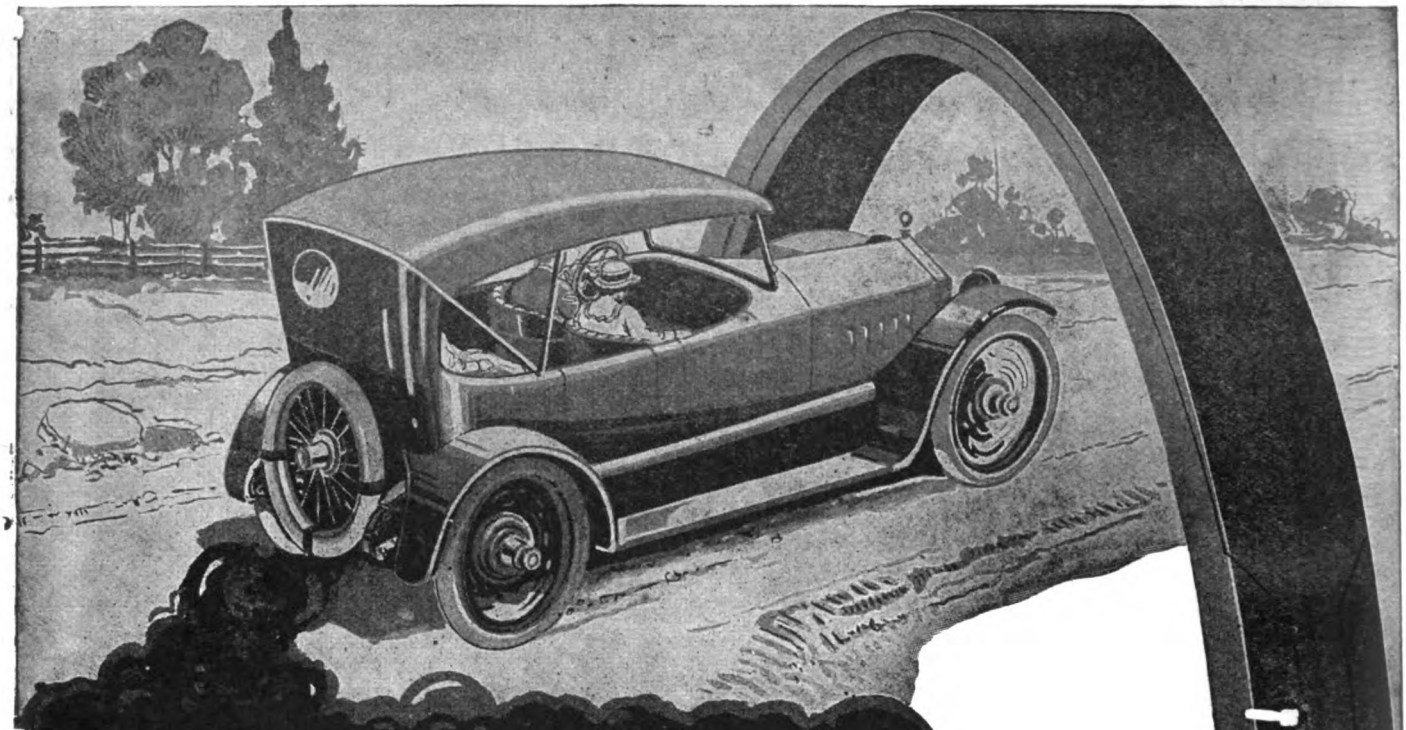
If your jobbers cannot supply you, write us at once. The dawn of peace and development of "best ever" business are right at hand. *Hurry*—is the word.

Higgins Spring & Axle Co.
Dept. 1214
Racine, Wis.

NO BOLT
NO HOLE
NO HUMP
NO JOLT

HIGGINS
QUALITY SPRINGS
FOR REPLACEMENT

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A SURE SIGN of carbon is a smoky exhaust, due to lubrication getting *past* the piston rings up into the combustion chambers where it *burns*. Leaky piston rings waste as high as 25% gasoline —one drop in four.

HI-COMP PISTON RING

THE RING THAT MAKES THE MOTOR SING

are the best gas-tight rings for overcoming engine troubles due to carbon—knocking, skipping, faulty ignition; valve pitting, wearing down of cylinder walls, piston and piston rings; smoky exhausts.

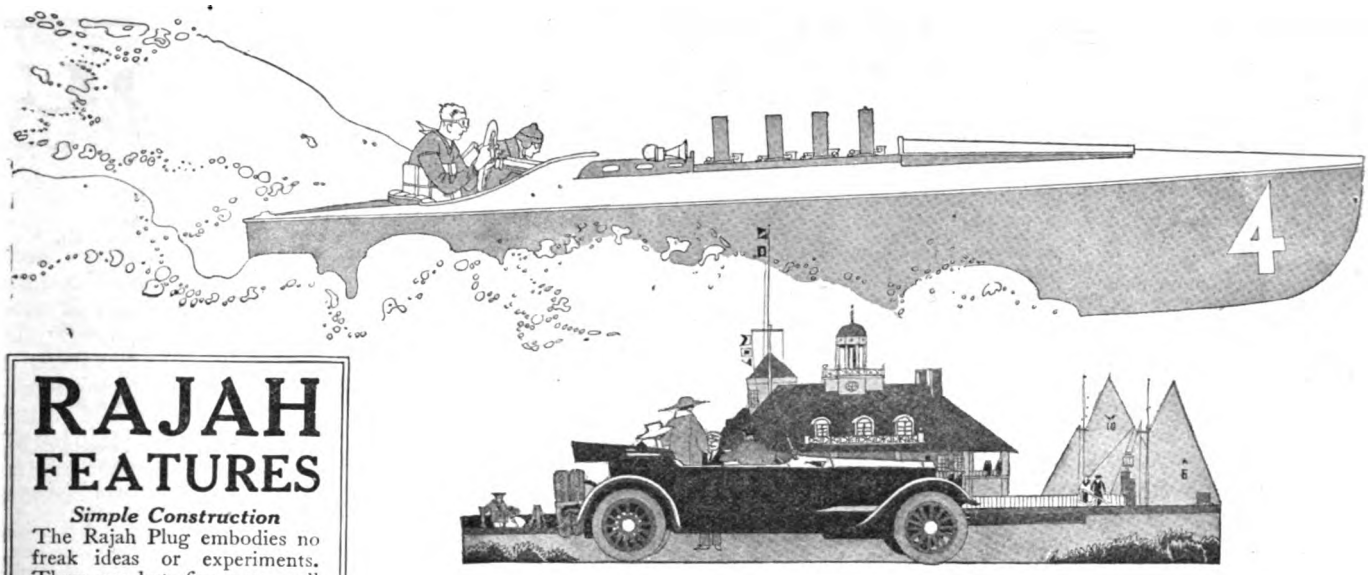
Hi-Comp Piston Rings are made from two perfectly balanced perfect eccentric rings into one absolutely gas-tight concentric ring. Each ring ground under oil — not buffetted — to preserve the true temper of the secret process gray iron and ensure high polish and gas-tight fit. Won't wear cylinders out of round — *proof* of gas-tightness. Make reboring of average cylinders unnecessary — an exclusive Hi-Comp advantage. Hi-Comp Piston Rings deliver every ounce of power from every drop of gasoline on to the piston head — no power or oil can get past them!

It will pay you to install Hi-Comp because of the satisfaction they give to you and your customers. Fully guaranteed by an old established piston ring company to give MORE POWER on less gasoline and oil. Write for booklet, specification chart and details of 90-day trial guarantee

The Continental Piston Ring Co., Memphis, Tenn.

The Ring that Makes the Motor Sing

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RAJAH FEATURES

Simple Construction
The Rajah Plug embodies no freak ideas or experiments. There are but five parts, all interchangeable, easily taken apart, cleaned and assembled.

Knife Edge Bushing
adjusts itself to the shoulder of the porcelain. All possibility of injuring the porcelain is thus eliminated when the bushing is tightened down to secure a gas-tight joint.

Insulation
consists of the highest grade, hardfire, heat-resisting porcelain, of special pattern, so assembled as to insure against firing through.

The Button Top and Rajah Clip Terminal
do away entirely with the necessity for either thumb screw, nut or other device for attaching the cable to the spark plug.

Rajah Terminals and Adapters
are furnished so that Rajah Plugs can be used with any car.



Rajah Regular and Ferrule Clip Terminals
Adjustable to any cable and with ferrule to fit any cable. With the extra collar supplied both can be used with any make of plug.



Rajah Thumb Nut and Stud Terminals
The Thumb nut is an adapter for Dodge, Ford, Hup, Hudson, Maxwell, Mitchell, Packard Twin Six and Pullman. The Stud for Buick, Chevrolet and Oldsmobile.



Rajah Ball Terminal
Adapter for Franklin, Locomobile and Willys-Knight.

Manufactured by
Rajah Auto-Supply Co.
Bloomfield, N. J.
Sales Department
Edward A. Cassidy Co., Inc.
280 Madison Ave., New York

The plug that puts power behind the pistons

In speed boats, racing cars and airplanes, Rajah Plugs unfailingly deliver the quick, hot spark that turns gasoline into power.

Rajah Plugs were used in the Hispano-Suiza motor when the world's altitude record of 28,900 feet was established at Dayton, Ohio, September 18th, 1918.

The automobile owner, who wishes to have available in his car the last ounce of power and be forever free from ignition troubles, should need no stronger endorsement than this.

The reputation of the Rajah is rapidly spreading through our national advertising and through the recommendations of satisfied users. Take advantage of this Rajah demand. It means quick and easy sales.



NOTE—Sell a complete set of Rajah Plugs to every customer. The delightful sense of quick response, increased power and absolute dependability will add to his satisfaction and hold his trade.

RAJAH SPARK PLUGS

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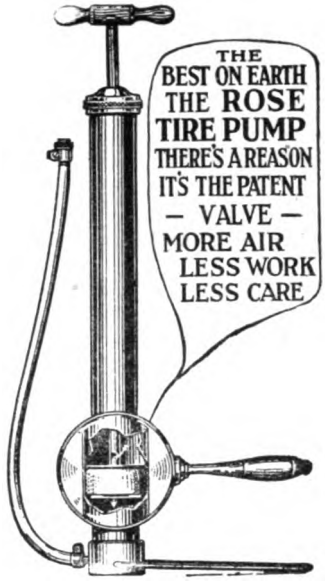
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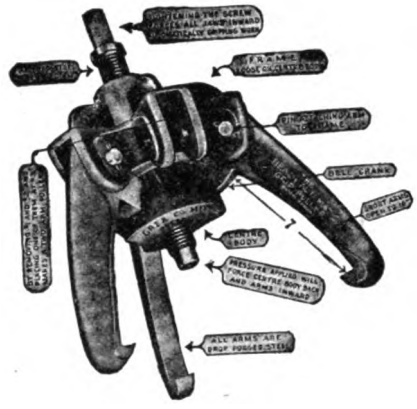
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Motor troubles are caused by lost power and excessive carbon

PRESSURE PROOF PISTON RINGS prevent this. Neither oil nor compression can leak past the piston and cylinder walls when Pressure Proof rings are used. Carbon is permanently eliminated, and oil and fuel conserved.

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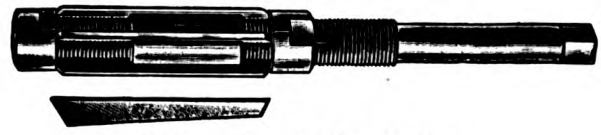
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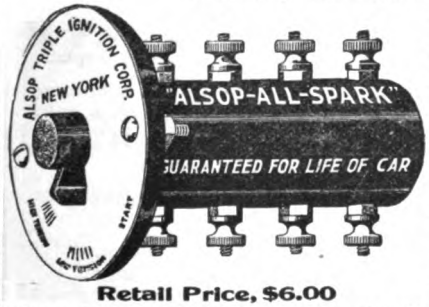
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Gives Two-Plug Ignition if desired
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Causes Perfect Combustion
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Prevents running engine with a misfire and the delays from changing spark plugs on trips.

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"THE CASE-HARDENED PLUG"



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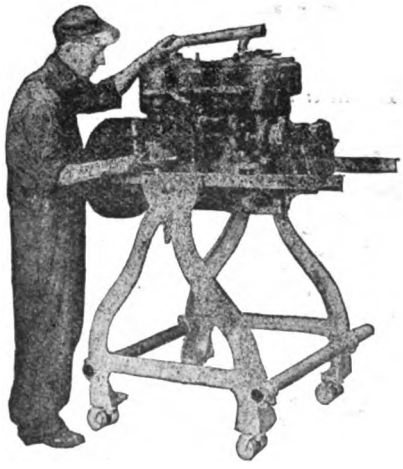
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INLAND I-X-L PUMP

The Original Running Board Pump.

The MOST POWERFUL, COMPACT PUMP made and EASIEST OPERATED.

Develops a leverage "18 times" the ordinary foot pump.

Cylinder is a SEAMLESS DRAWN STEEL SHELL REQUIRING NO PACKING.

Material and construction the very best, assuring permanent service.

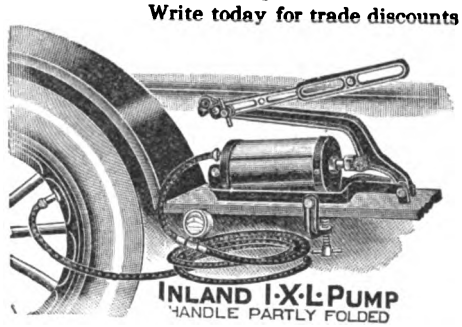
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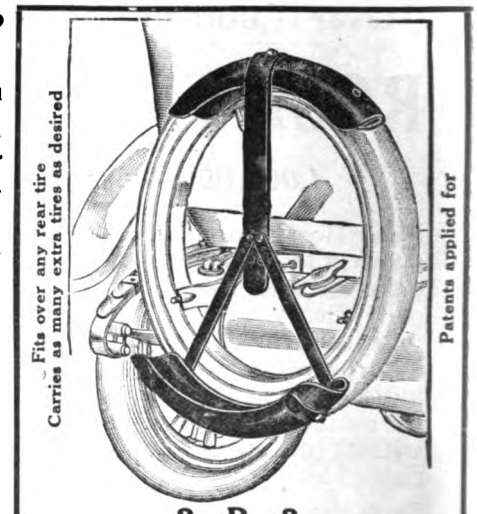
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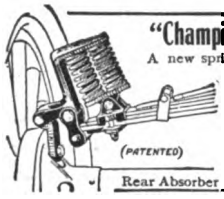
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The second extra tire is supported by the first, the third by the second, etc. Strap all together on both sides. Write for further particulars; our full line will interest you.

The International Stamping Co.

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OF THE

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Our Regular January, 1919 Issue



Final Forms Close January 5th, 1919

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Why not let us get up the right kind of copy in our "Put-It-Over Department"? If you don't know what we mean by this, write us and we will be glad to explain.

This will be the first NEW YORK SHOW since the dawn of Peace and it is more important than ever before for you to be represented in our magazine with a good strong announcement.

Don't wait or you may be too late to secure the best position and service.

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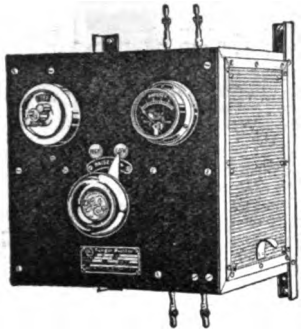
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The 6 amp. 75 volt Tungar Rectifier is a practical device demonstrated by actual service. It equips your garage for efficient battery charging at a much lower cost than any other reliable device of similar capacity.

Ask for Folder 63951

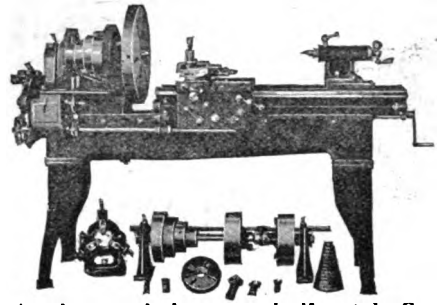
GENERAL ELECTRIC COMPANY

General Office: SCHENECTADY, N. Y. 35 A-3

THE UNIVERSAL GARAGE LATHE

Is our 14-24" Sliding Extension Gap Lathe

JUST THE THING FOR GARAGES AND REPAIR SHOPS



Saves investing in a large expensive lathe. Swings 14½ in. over top bed, and 24 in. through gap. The 7¼ ft. machine takes 8 ft. between centers.

Cuts right or left-hand threads, and can be furnished with transposing gears for millimeter threads.

Machine is strong, rigid and accurate, has 2⅛ in. spindle with 1⅝ in. hole through same. There are six quick change geared feeds and other new features. Great range and value at a reasonable price.

Taper Attachment, Milling Attachment and other accessories if wanted. *Send for bulletins and prices.*

BARNES DRILL COMPANY Incorporated 1907

818 CHESTNUT STREET - - - - - - ROCKFORD, ILL.

Builders of the ALL-GEARED DRILL

START A TIRE REPAIR BUSINESS

MAKE GOOD MONEY WITH THIS GREAT OUTFIT

Big capacity vulcanizer with self-contained steam boiler—a complete tire repair plant that will make both outer casing and inner tube repairs on practically all kinds and sizes of tires on the market.

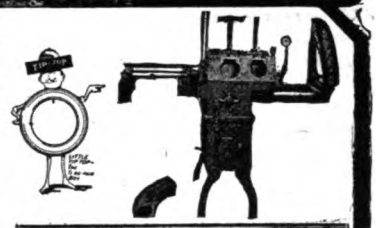
New Type-F Equipment

We make a complete line at all prices. Write today for booklet, "Tire Repairing, the Business of the Times."

THE AKRON RUBBER MOLD & MACHINE CO.

917 Sweitzer Ave., AKRON, OHIO

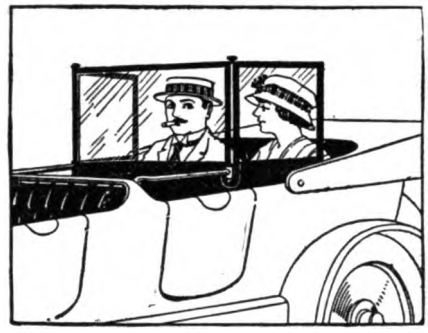
Pacific Coast Distributors—Geo. W. Eno Rubber Co., 280 Golden Gate Ave., San Francisco; 1026 So. Los Angeles St., Los Angeles.



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"J. H." TONNEAU OR Rear Seat Shield

FOR EVERY TOURING CAR

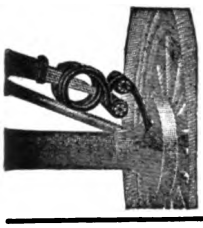


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The Comfort of a Limousine Minus its Cost.

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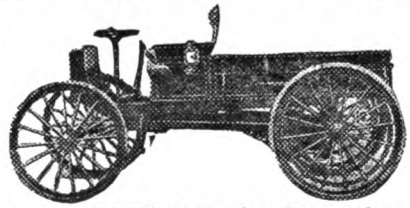
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For Ford, Maxwell, Studebaker, Pierce Arrow and All Cars.

Write for Agents Proposition and Prices

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Ar more economic than others because they ar light, simpl, and carry more paying load in proportion to their weight. Prices $600 up. Catalog Free.

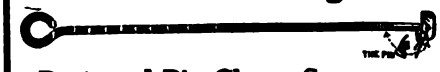
DURYEA LABORATORIES, 18th St., Philadelphia, Pa.

Our Recording Thermometers ar also wonders

FAWSCO

Improved Combination

Oil Cock Wrench & Cleaner —AND— Gasoline Gauge



Patented Pin Clears Stoppage

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Ball Bearings Remade

NEW BEARINGS, SPECIAL BEARINGS

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Terrific pulling power. No "struggle"—no slipping. "Harder the pull, the tighter the grip." Sure, speedy action. Adjustable to 13 in. Tough Drop Forge Steel construction. Price $10. Big Dealer Discount. Send NOW. Money back if not satisfied.

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ALL TYPES — IN STOCK — MANY SIZES

THE GWILLIAM COMPANY ENGINEERS

253 W. 58th St. (at Broadway) NEW YORK

Branch: 1314 Arch St., Philadelphia

Will dissolve in the water and stop that leak in the Radiator or Water Jacket

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Ask your Dealer or write direct.

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THE NORTHWESTERN CHEMICAL CO., Marietta, O.

TIRES

All Standard Make "SECONDS"

At last Spring's low discounts

Write for Jobbers' Stock List and Discounts

Jandorf Auto Co., 1762 Broadway, New York

THE SUNDERMAN VACUUM CARBURETOR

positively saves from 30% to 50% of your gasoline.

Increased mileage on a Ford car 128% in the New York Herald's recent test on the Sheepshead Bay Speedway. Splendid dealer's proposition.

SUNDERMAN CORPORATION

13 Chambers Street, Newburgh, New York



"UNIVERSAL" Extension Pedal

One model for all styles and shapes of clutch and brake pedals.

Price with rubber pads $5.00 Plain $4.00 per pair.

RICH MFG. CO. 1777 Broadway, New York

STENMAN ELECTRIC VALVE GRINDER

THE STENMAN ELECTRIC VALVE GRINDER CO., Inc.

42 Southbridge Street WORCESTER, MASS

It Pays to Advertise IN THE Automobile Dealer and Repairer

Write for Advertising Rates

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BILT-RITE

TRADE MARK

BILT-RITE

An Up-to-the-Minute
COMBINATION DRILL & VALVE GRINDER

It Is Electric and Portable

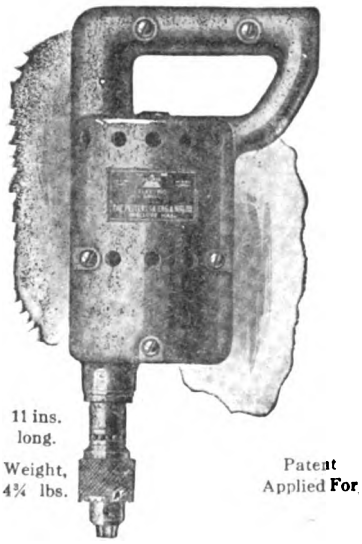
BILT-RITE has a more direct bearing on the Repairman's success than any other tool ever invented—for the best reason in the world—it is two indispensable Tools in one—at the price of one. When not in use grinding your valves, **BILT-RITE** is always available for small miscellaneous drilling so frequently a part of the day's work in any garage repair shop. The change from one operation to the other is made in the fraction of a minute!—The mechanical features remaining the same.

BILT-RITE contains no empty talking points—and no frills to make it impressive. It is absolutely dependable in its double capacity.

Every conceivable precaution conducive to durability has been carried out. Ideal bearing surfaces, with proper distribution of material at points of greatest strain, makes possible a relatively light weight consistent with strength and endurance. The entire mechanism is enclosed and protected in an aluminum casing.

BILT-RITE is a power as real in its own realm as the physical energy radiated by the Sun. It is a masterpiece of mechanical simplicity.

No more experience is required to use a Combination Drill and Valve Grinder than to use the telephone. Besides saving shovelfuls of dollars it does the work quicker, better, even with unskilled labor, and certainly more uniform than it could possibly be done by hand.



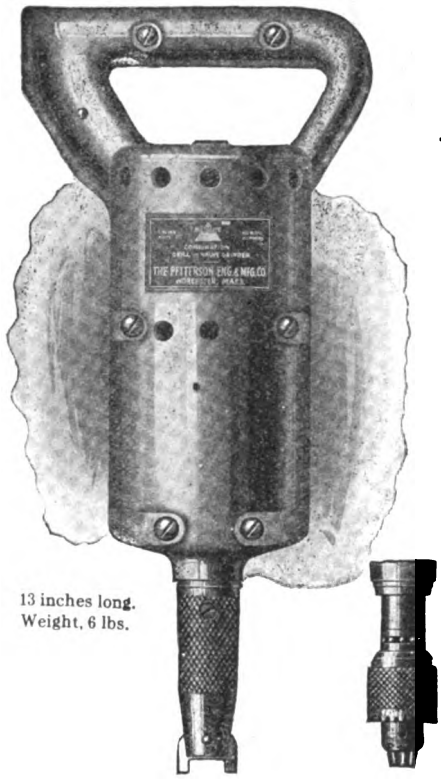
11 ins. long.
Weight, 4¾ lbs.

Patent Applied For

BILT-RITE
Portable Electric Drill

Put new sparkling enthusiasm in the shop! Get the work out! Those small odd drilling jobs can be handled quicker and better with a light portable Electric Drill.

For instance, it certainly isn't practical to use a large Power Drill on ¼-inch work, and it's too slow and tedious to do similar work with a breast drill. Therefore, a **BILT-RITE** Portable Electric Drill embodying distinctive features in design, insuring unquestionable endurance, is a timely and profitable investment.

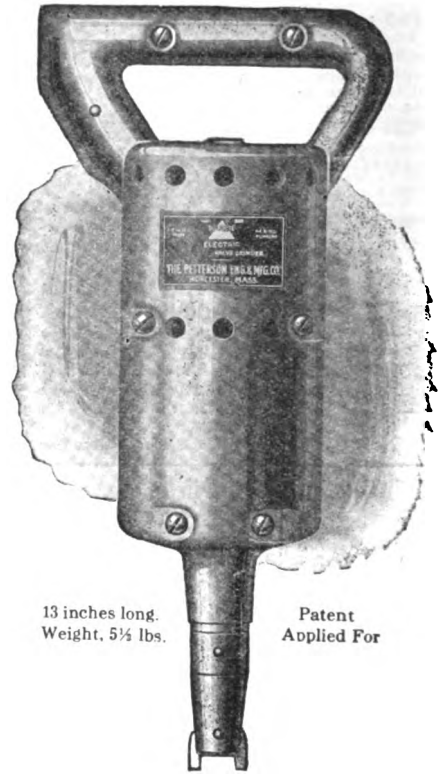


13 inches long.
Weight, 6 lbs.

BILT-RITE
Combination

For Valve grinding or for Drilling Holes up to ¼-inch in diameter, giving you the familiar oscillating motion for valve grinding and the required speedy motion for drilling, neither operation interfering with the other in the slightest degree.

Correspondence solicited from reputable dealers everywhere.



13 inches long.
Weight, 5½ lbs.

Patent Applied For

BILT-RITE
Electric Valve Grinder

The vigorous and constant electric masterworker that cuts down labor two-thirds and puts quick action on slow jobs.

There isn't a more tiresome job in the Auto Repair Shop than hand valve grinding. A **BILT-RITE** Electric Valve Grinder is never tired—whether it's the first or last valve does not make any difference; obviously, more uniform results obtain even with unskilled labor.

Grinds Valves on Automobiles, Auto Trucks, Aeroplanes, in fact any internal combustion engine where the valve does not exceed three and one-half inches head diameter. **BILT-RITE** is a profit multiplier for you—see the point.

CUT OUT THIS COUPON AND MAIL IT TO US TODAY

Petterson Engineering & Mfg. Co., Worcester, Mass.

I am interested in BILT-RITE—send me full details, prices and terms.

NAME .....

STREET ADDRESS .....

CITY..... STATE .....

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"THAT'S THE TOOL FOR ME!"

BILT-RITE

BILT-RITE

TRADE MARK

Conceded by experts to be the most capable tool in the world—displacing at one blow all ordinary Electric Portable Drills on account of its double capacity—grinding valves, and by quick change drilling holes.

NO OUTSIDE projections interfering with work in close quarters. Smooth and compact. Perfect interchangeability of parts. Mechanism divided into four parts. Parcels post will deliver any part on short notice.

Button Switch in handle located conveniently to finger, starts or stops machine instantly. Lubrication: gearing system packed in grease. Oil holes for Motor, Oscillator, and Drill Shaft bearings.

Substantially housed steel gears throughout, no gear less than thirteen teeth. A Split Casing. Removal of screws holding casing together exposes whole interior, facilitating repairs and replacements.

A "Service Agreement" supporting the endurance claims we make on all **BILT-RITE** products will be furnished the purchaser upon application direct to the factory or Distributor.

Manufactured By

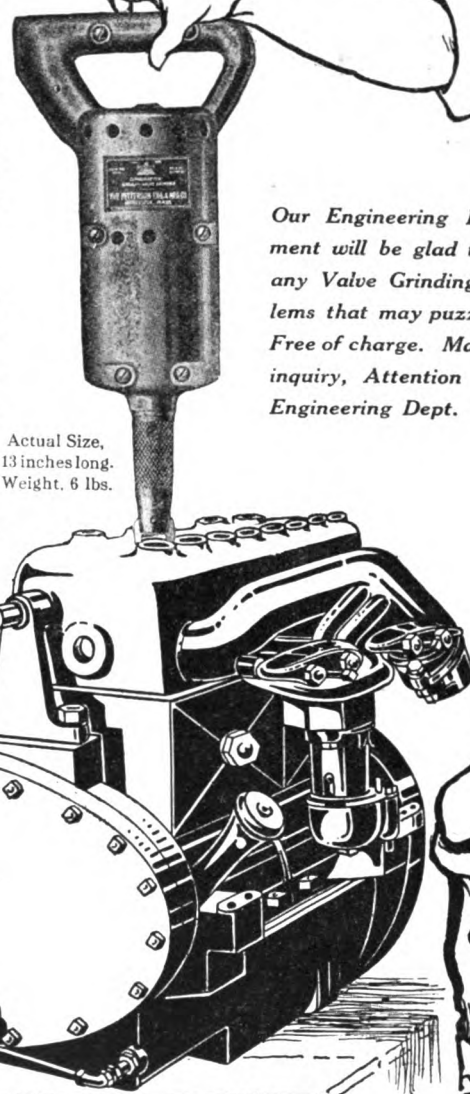
Petterson Engineering & Mfg. Co.

311 Main Street
Worcester, Mass.

Drill Speed 1758 R.P.M.

Valve Grinder 737 Oscillations per minute based on 10,000 motor revolutions.

Our Engineering Department will be glad to solve any Valve Grinding problems that may puzzle you. Free of charge. Mark your inquiry, Attention of the Engineering Dept.



Actual Size, 13 inches long. Weight, 6 lbs.

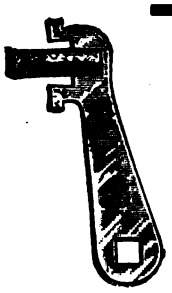


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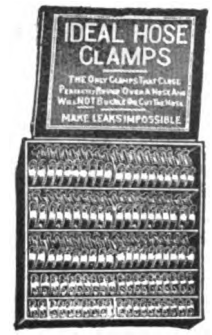
Ford Keys
one and two piece



Pump Hose
Clamps
⅜—7/16—½—⅝







No. 1—180-Clamps
No. 2—100-Clamps

IDEAL CLAMP MFG. CO., Inc., 200-202 Bradford St., Brooklyn, N.Y.

WOULD YOU RATHER WALK
Than Start Your Motor on a Cold Day?



Price with
Auxiliary
Air Control
$12.00

Zero weather and a common carburetor is a combination to try men's souls.

A "D & B" Carburetor

with Springless Mixing Valve and Auxiliary Air Control insures a quick start and economical operation regardless of weather.

It is designed for a Ford motor, makes the Ford owner independent of weather and insures maximum mileage and power throughout the year.

Get one now and stop kicking.

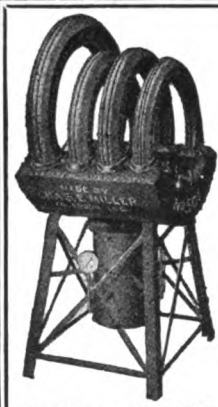
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O. C. HARRINGTON CO.,

343 N. Crawford Avenue, • Chicago, Ill.

Mid-West Distributors:
GRAY-HEATH CO., 1440 Michigan Ave., Chicago, Ill.,

New England Distributors:
The POST & LESTER CO., 112 Allyn St. Hartford, Conn.



Gas Burner $195.00

Extra Ply Tires & Tubes

Best Quality
Lowest Prices

Sales repeat for Exclusive Jobbers

More Fabric Means Less Blowouts.

Free — new 84 page "Red, White & Blue" catalog and tire prices for the asking.

4-Cavity En Bloc Retreader places ribbed tread, all sizes casings, 2½ to 5½ inches inclusive.
Single cavities also.

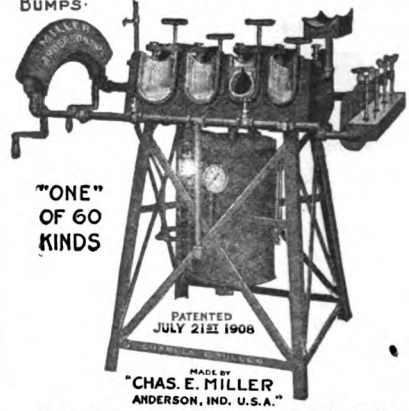
Miller's Vulcanizers are Standard

Wrapping machines and all supplies.

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Why Experiment?

INSULATED AIR-COOLED FLANGES · PREVENT BUMPS ·

USE MILLER'S WHY EXPERIMENT



"ONE" OF 60 KINDS

Complete Gasoline Burner $168.00

Write today, Department "H"

CHAS. E. MILLER, Anderson, Ind., U.S.A.

1894 — Established 25 Years — 1919

Hang on to your old tires. They will last as long as you live if covered with steel. **The Kimball Steel Protector** makes **Blowouts, Punctures** and **Rim Cuts impossible.** A few sections will hold any old blowout. Tires as flexible as ever.

Special inducements to those in new territory.







MUD CHAIN can be put on in a jiffy with one hand while standing on the run board. If you get in a mud hole you will laugh out loud. Hook the ends together and pull the little lever and they are on tight. Good for blowouts.

KIMBALL TIRE CASE CO., 174 Broadway, Council Bluffs, Iowa

MILEAGE MEANS MORE THAN EVER BEFORE

in your customer's eyes. War-time economy demands maximum service. Sell them the lubricants that will help them to get the utmost efficiency out of their cars.

DIXON'S GRAPHITE Automobile LUBRICANTS

serve your customers and your best interests equally well. You can build business of the better kind by banking on Dixon's.

Write to us for Dixon's Dealer's Deal No. 184-G.

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Far Be It From Me—To Keep You In Doubt—

Every Country Blacksmith I ever knew or heard tell of—always had a stockin' full of long green soaked away!

Does he really buy Automobile Accessories?

Is he the coming big buyer of Auto Equipment?

It's easy enough to find out!

Use the coupon.

Bill Wise

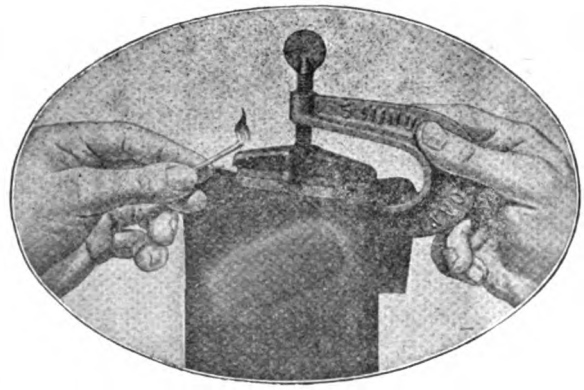
We Getcha, Bill!

Yes — we wanta Know about these Country Blacksmiths — give us an eye-opener!

We are makers of_____

BILL WISE
P. O. Box 654
New York, N. Y.

Name _____
St. address _____
City_____ State_____



A Million Motorists Use It 4,000,000 More Need It

The limited supply and increasing cost of inner tubes makes it necessary for motorists to repair punctures, cuts, tears and cracks—to keep their tubes in good repair These conditions make it imperative for motorists to stop the easy-going, wasteful habit of carrying $5 to $15 worth of spare tubes—that deteriorate quickly—and scrapping perfectly good inner tubes that merely have a puncture, cut or tear—which can be repaired *permanently* with a Shaler 5-Minute Vulcanizer, quicker than a new tube can be inserted.

Saves Tubes—Saves Repair Bills

You can repair your own tubes—as good as new. It's easy and inexpensive. *The Shaler works automatically* —and without fail. Just touch a match to the non-flaming chemical fuel. In five minutes you have a firm, flat, "feather-edge," permanent repair—stronger than any "stuck on patch"—stronger than the tube itself. No gasoline, cement or flame, and no danger of injuring the tube. Carry it in your tool box for emergency use. It works in the wind, in any weather, anywhere The heat is applied directly to the pure gum patch and does not extend to the tube itself.

Complete Outfit Only $1.50

The outfit includes, the Vulcanizer—12 Patch & Heat Units (6 round for punctures, and 6 oblong for cuts)—complete, $1.50. Extra Patch & Heat Units 75 cents per dozen.

Sold By Accessory Dealers and Jobbers

TO DEALERS—To insure shipments—it is advisable to order from your jobber now. The great demand has exceeded our factory capacity and shipment will be made according to priority in receipt of orders

Catalog of the Complete Shaler Line of Vulcanizers for Motorists, Repair Shops and Garages mailed on request.

C. A. Shaler Co., 812 Fourth St., Waupun, Wis.
Oldest and Largest Manufacturers of Vulcanizers



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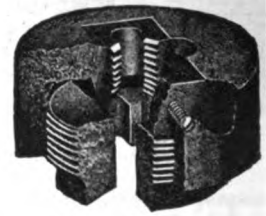
A Pointer

Poor tools or lack of tools is the greatest hindrance the repairman has. The novice with an assortment of good tools can accomplish more.

No garage equipment is complete without a G T D Screw Plate. Not only will it recut jammed threads, but new threaded parts can be made—and it's mighty hard to get spare parts now-a-days.

G T D Screw Plates are made in over a hundred assortments. Yours is among them.

Write for New Small Tools Catalog No. 40, describing Screw Plates, Taps, Dies, Reamers, etc.



Little Giant Die, Guide and Collet



Little Giant Die

Greenfield Tap and Die Corporation

Greenfield, Massachusetts

New York, 28 Warren St. Chicago, 13 So. Clinton St. Detroit Office, 74 Congress St., W.
Canadian Plant ..... Wells Brothers Company of Canada, Ltd., Galt, Ontario

Buy a

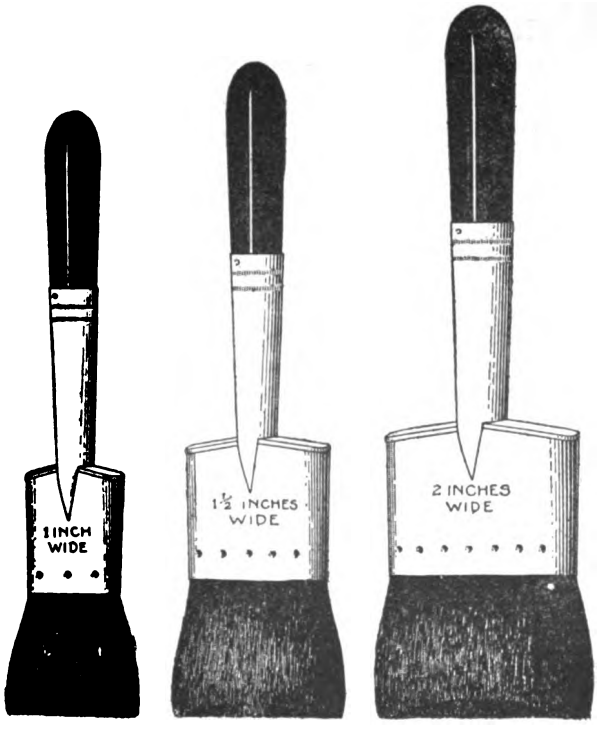
G T D Screw Plate

With

Little Giant Adjustable Reversible Dies

IMPORTANT POINTS ABOUT PAINT AND VARNISH BRUSHES

A Set of Three Brushes and the Automobile Dealer and Repairer for One Year for $2.00



Brushes Needed in Repainting and Varnishing an Automobile.

Did it ever occur to you that there was much difference between a good paint or varnish brush and a poor one? Probably not. To most people a brush is just a brush. Yet an analysis shows that there is an almost measureless difference between a good brush and poor one.

For instance, a properly made Flowing Fitch brush is hermetically sealed, so as to keep the paint, or whatever may be used, from getting into the brush at the top and loosening the hairs. All such properly made brushes are solidly set in glue cement inside a leak-proof ferrule, and a whole row of neatly clinched nails are driven in at the end of the ferrule to give added security, and a guarantee that the hairs will not pull out.

A Fitch brush is *smooth*, *soft*, and *flowing*, and does not "mush" up or get flabby like a cheap brush, but holds its springiness. The trouble with cheap brushes is that the ferrule is nothing more than a single band of tin, open at the top, with a couple of nails jabbed through. When you use such a brush the cheap hair will pull out and scatter all over your work, because it is not held in securely enough to stand the drag of the brush in painting or varnishing.

A brush may be washed with gasoline or kerosene oil, but to clean it thoroughly turpentine should be used. No brush used for painting should be used for varnishing.

We have recently made arrangements with one of the best manufacturers of these properly made brushes in New York to offer a set of Three in connection with a subscription to the AUTOMOBILE DEALER AND REPAIRER for a year for an even $2.00. These brushes sell at retail for $1.40. It will be seen, therefore, that there is a substantial advantage in sending to us for the AUTOMOBILE DEALER AND REPAIRER for a year, and for a set of these brushes.

Present subscribers can have their subscriptions extended for a year, and secure a set of brushes, on the same terms. These brushes are guaranteed in every respect, and though they cost more than cheap brushes would cost, they are far cheaper in the end, because of their lasting qualities and the good work that can be done with them. No man can afford to waste expensive paint and varnish on an automobile by using a cheap and poorly constructed brush, such as is usually to be found wherever brushes are sold. The ordinary dealer in brushes himself as a rule has very little knowledge of the quality of the brushes he sells.

Remit by check or money-order, and your name will be entered as a subscriber to the AUTOMOBILE DEALER AND REPAIRER for a year, and a set of these brushes, which are just the right size and shape (see illustration, which is exactly one-half the actual size of the brushes,) will be sent to you, postage prepaid.

Address all orders to the

MOTOR VEHICLE PUBLISHING CO.

Publishers of the

AUTOMOBILE DEALER AND REPAIRER

71-73 MURRAY STREET, NEW YORK

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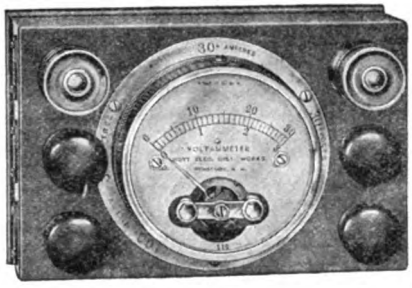


"NAIL" The First Man You Meet—

Ask him which is the best—the complicated conventional old type of Voltammeter or

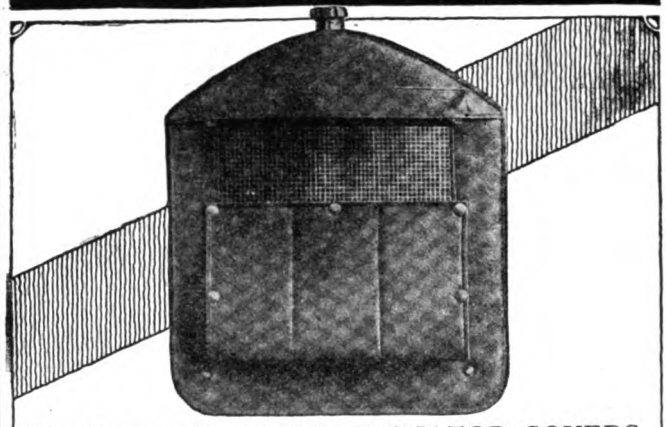
THE HOYT ROTARY METER

If he says he doesn't know—tell him he doesn't know what he is missing! For the Hoyt Rotary Meter may be used to determine the output of the generator, the rate at which the battery is discharging, the current consumption of each individual lamp, the entire lamp load, the condition of the wiring, the voltage of the storage battery, the voltage of each individual cell, the current required for the starting motor. It will detect leaks, grounds, short circuits or open circuits in armatures, fields, or commutators, of motors or generators. Pretty good? Very good, you bet! Send for particulars.



HOYT ELECTRICAL INSTRUMENT WORKS
Pennacook, New Hampshire

The ALLEN RADIATOR COVER



The demand for ALLEN RADIATOR COVERS is constantly increasing because this cover is the *only* positive protection from freezing. Handsomely designed and finished. Made of fabric leather with moleskin back.

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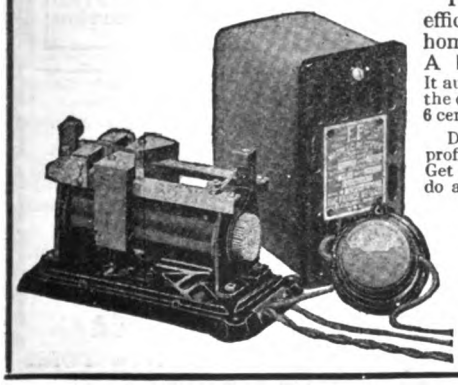
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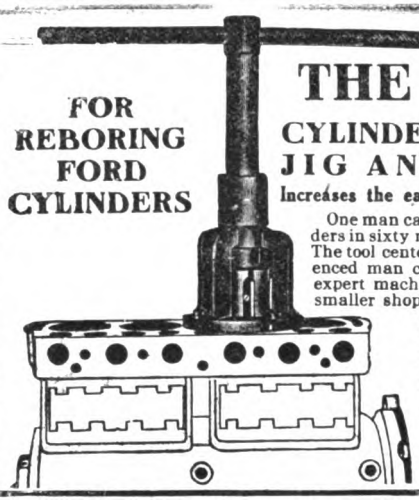
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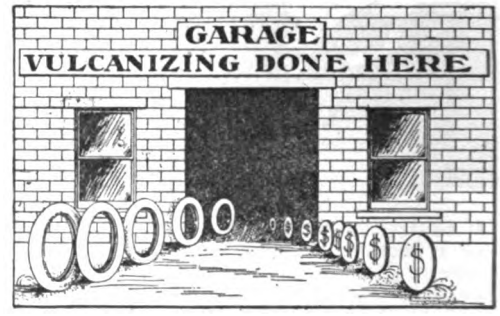
The Hinckley Machine Works
Hinckley, Ill.

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THE HEINTZ ELECTRIC STEAM VULCANIZER

will add a money making department to your business—your help is needed right now at Tire Repairing, there is so much work to do. The Heintz Electric Steam Vulcanizer is a master worker in this line. It is not an old-style machine. It is a new, fast working Vulcanizer patented April 9th, 1918, with other patents pending.





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No. 3. Vulcanizes by steam heat.

No. 4. Heated by electricity from lighting socket.

No. 5. Steam pressure and temperature automatically controlled. No attention required.

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Consumes less electricity than an electric flatiron. Capacity large. It is a high class Vulcanizer at a low price. It is a splendid paying proposition because Vulcanizing will last as long as automobiles are made.

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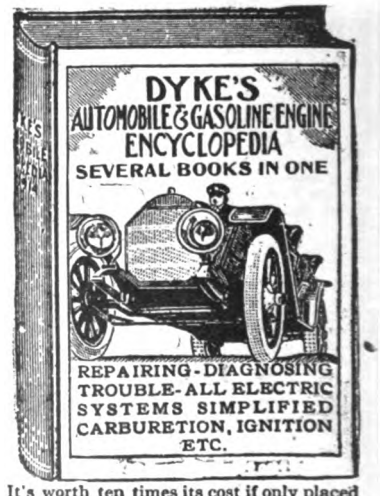
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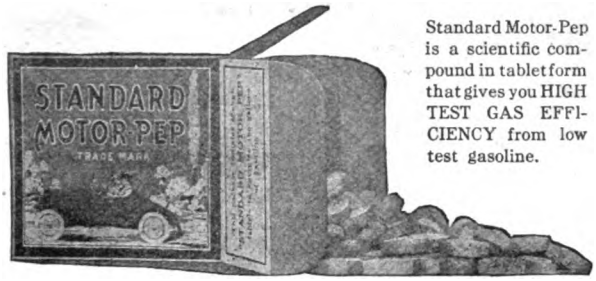
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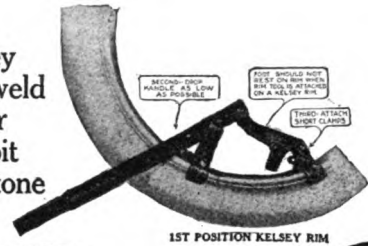
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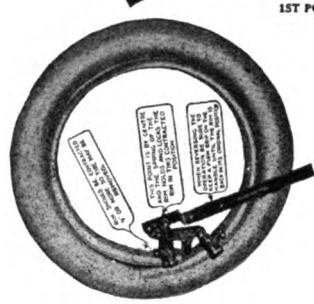
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"Wallop" your rim with a hammer to force it in or out of place and you are bound to have greater trouble next time **DO THE SENSIBLE THING.** Provide yourself with the best rim tool on the market and save time, trouble and rims. With the **BEACH RIM TOOL** You can quickly expand or contract any make of cross-split demountable rim—the Beach is universal and takes them all.

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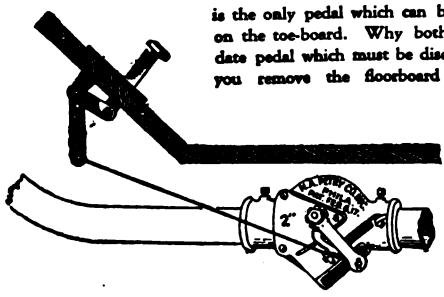
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No other is like it in construction—no other can be like it in results. Whatever your requirement may be, the Petry Universal Pedal will meet that requirement in a way that could never be met before. Made of high-grade steel, with special processed gun-barrel finish, the Petry Pedal is adjustable to pull or push for muffler cut-outs of any style, kind or size; Accelerator, Exhaust Whistle or Horn—and Heater Valve.

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that we now do all kinds of expert armature rewinding

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Cold weather means lower motor efficiency. If your motor is choked up with carbon, **you are wasting gasoline!** When you have the carbon deposits scraped or burned away, **you are pouring gasoline down the sewer,** because **Carbon is Power.**

Consume the carbon deposits with

CARBON-X

The Guaranteed Carbon Consumer

Thus **utilizing** the wasted power, and then **keep your motor clean** with a small application of Carbon-X every four or five hundred miles. **Don't throw away gasoline!**

Carbon-X positively **will not injure** the interior of any motor, nor affect the lubricating oil in any manner.

DON'T "LAY UP" YOUR CAR—DRIVE IT!

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Ask for our unusual book—WHY IS CARBON?—it's free.

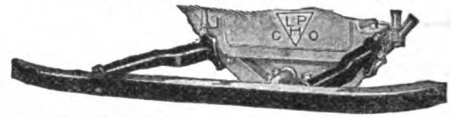
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HELPS for FORD Cars

HALLADAY BUMPERS



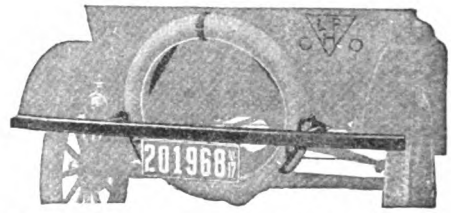
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It is built for hard service, is quickly attached, and stays put.

It is the strongest and lightest front bumper for Ford cars on the market.

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With or Without Tire Carrier



It is secured to the car frame only, without cutting or altering.

The top support of the tire is an extension from the tire cradle and is in no way secured or attached to the car body.



HALLADAY TILTING STEERING WHEEL

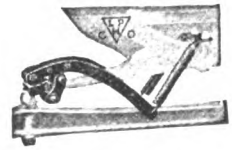
A rigid, non-rattling steering wheel, quickly attached in place of the regular wheel.

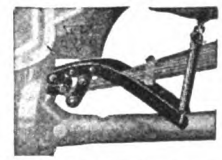
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15 and 17 inches in diameter

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The latest improvement includes **all steel construction,** double arms and springs, with hardened steel pins in malleable steel bearings.

Flexlevers are the only shock absorbers of this type that can be attached without removing the wheels or spring perches.

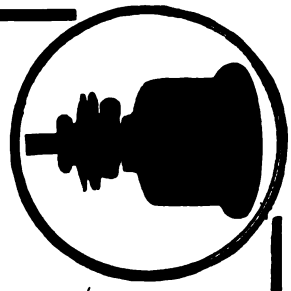
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"HELE-SHAW" CLUTCH

(It is Patented)

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Bulletin No. 3

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In one direction the square edge gathers the surplus oil. In the opposite direction the oil is distributed again, from the sloping face, pulsating as it were, preventing the groove from clogging.

Years ago plain piston rings were made with grooves. They were not a success, and abandoned. Imitations of "NO-LEAK-O" rings are now springing up all over the country; they are not a success, because they are not mechanically correct. Not made of same material, not made under same processes.

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Oxigene will increase the mileage 25 to 50 per cent.
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priming or pouring hot water on carburetor when you can **Vaporize** the gasoline with Thorwald's Electric Carburetor Heater and start your motor very easily on the coldest day of Winter.

FLASH



and your tire is off, **The Lightning Tire Tool** is positively the most effective Tire Tool ever designed for removing and putting on tires, it loosens the beads from rim.

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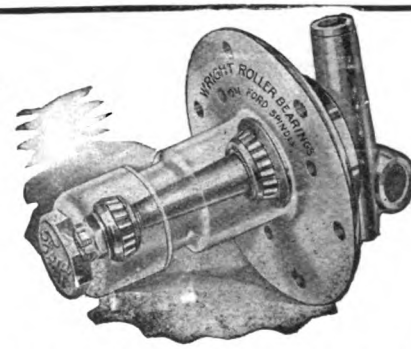
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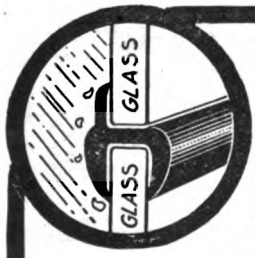
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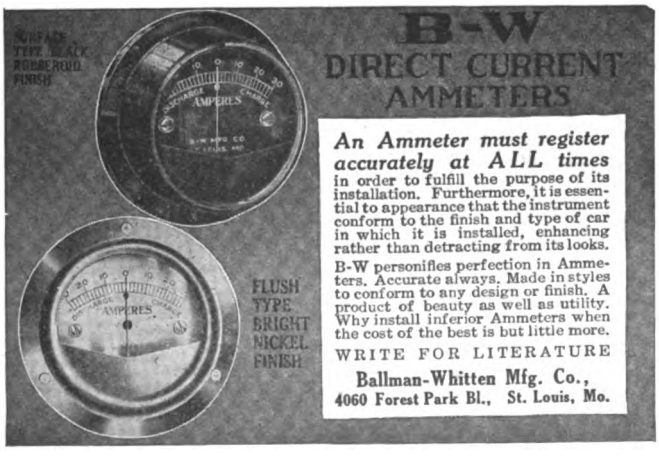
They Remove Carbon Where Others Will Not



Cut out experimenting—get down to business. Why not own a set of FLEXIBLE CARBON SCRAPERS? They are the only scraper on the market that will do a satisfactory job without taking the motor to pieces. Compounds are dangerous. All good mechanics advise scraping carbon. Over 100,000 sets now in use by Auto Mechanics.

Price Per set, $1.50. Ask Your Dealer or Write

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B-W DIRECT CURRENT AMMETERS

An Ammeter must register accurately at ALL times in order to fulfill the purpose of its installation. Furthermore, it is essential to appearance that the instrument conform to the finish and type of car in which it is installed, enhancing rather than detracting from its looks.

B-W personifies perfection in Ammeters. Accurate always. Made in styles to conform to any design or finish. A product of beauty as well as utility. Why install inferior Ammeters when the cost of the best is but little more.

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CORED BARS of Bunting Bearing Bronze are increasingly becoming a part of the standard repair equipment in well equipped repair garages. These bars are made of the same quality bronze as our finished bronze bushings and bearings, used by leading manufacturers

All Jobbers and Dealers

Ask for Catalog X

THE BUNTING BRASS & BRONZE CO.
740 SPENCER STREET, TOLEDO, OHIO

CORED BARS

STOCK SIZES

Piece No.	Outside Diameter	Inside Diameter	Length	Approx. Weight
A	1	½	12	2
B	1¼	½	12	3½
C	1½	¾	12	5
D	1¾	¾	12	7
E	2	1	12	8½
F	2¼	1¼	12	10
G	2½	1½	12	11½
H	2¾	1¾	12	12¾
I	3	2	12	13¾
J	3¼	2¼	12	15½
K	3½	2½	12	17
L	4	3	12	21
M	4¼	3¼	12	20

Send for free sample of The Automobile Dealer and Repairer.
MOTOR VEHICLE PUBLISHING CO.
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If you can repair and adjust Electrical Equipment, you will get the cream of the garage business. With the increasing demand for services of this sort, you must equip to handle the business, or lose it to your more enterprising competitor.

Weston

Model 280

GARAGE TESTING INSTRUMENT

is your one great and urgent necessity to enable you to locate electrical troubles quickly and apply the proper treatment to remedy them. Its possession will place you a long way ahead of your competitor not so equipped. This instrument is extremely accurate, durable and serviceable. It is the most practical electrical equipment you can install.

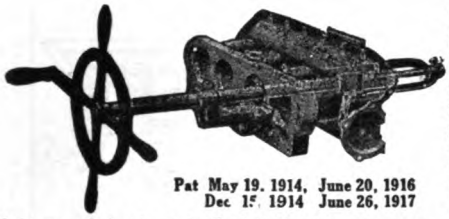
The Weston Company is pre-eminent throughout the world in the production of highest grade Electrical Precision Instruments.

We are returning to normal conditions as rapidly as possible, but we necessarily must complete government work in hand before full normal service can be rendered.

WESTON ELECTRICAL INSTRUMENT CO., 2 Weston Ave., Newark, N. J.

23 Branch Offices in the Larger Cities

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Pat May 19. 1914, June 20, 1916
Dec 15. 1914 June 26, 1917

THE HEISER IMPROVED CYLINDER REBORINC TOOL for Ford Motors is the only Reboring Tool in the world that is self sharpening It is the only Tool except expensive grinders that will not leave the finished cylinder slightly tapered toward the bottom. It is the only Tool that rebores between centers—this insures a finished cylinder, square with the crank shaft round straight and true It is adjustable, and the only Tool that will rebore different sizes without losing the adjustment.

The best mechanic in the world can't build reputation without proper TOOLS and EQUIPMENT. THE HEISER IMPROVED CYLINDER REBORING TOOL MAKES GOOD SHOPS OUT OF POOR ONES AND BETTER SHOPS OUT OF GOOD ONES.

Write to-day for full particulars

Heiser Special Tool Co., Dept. A, Kingston, Missouri

INSURANCE AGAINST TROUBLE



MOTOR SASCO STRAINER

KEEPS DIRT AND WATER OUT OF THE CARBURETOR

This means a steadier running MOTOR and the elimination of many mysterious stops while on the road. MOTORISTS have learned that a perfect strainer is an absolute necessity, and so thousands are sold every day.



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Attractive dealers' proposition. Write for full details.

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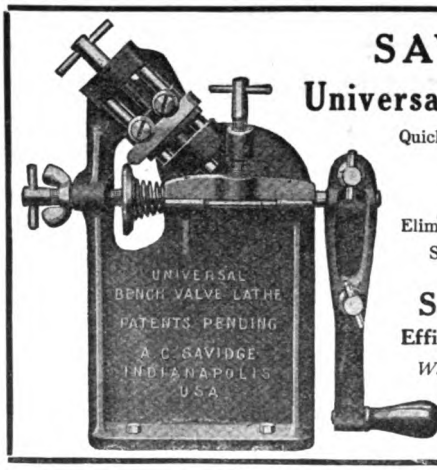
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There's something about the balance and grip of a "RED DEVIL" that isn't in ordinary tools - it comes from extra care in designing and making. And they are *guaranteed* for strength and service.

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Universal Valve Lathe

Quicker and more accurate than a machine lathe.

Self centering.

Angles accurate.

Eliminates those carbon ridges.

Saves gasoline and gives smooth motor.

Saves Grinding

Efficient Inexpensive

Write for Full Information

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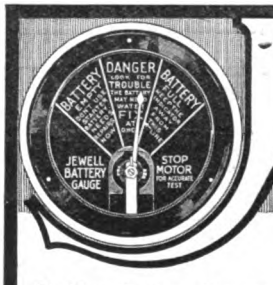
44,755	Auto Dealers, U. S.	$3.00 per M.
8,939	Ford Dealers, U. S.	$20.00 or 4.00 per M.
5,519	Truck Dealers, U. S. (showing make of truck handled)	15.00 or 4.00 per M.
400,000	Truck Owners	7.50 per M.
8,600	Truck Owners in Chicago	7.50 per M.
47,943	Garages, U. S.	3.00 per M.
55,967	Auto Supplies, Retail, U. S.	3.00 per M.
45,054	Repair Shops	3.00 per M.
404	Auto Manufacturers	3.00 per M.
73,674	Auto Dealers, Garages, Supplies and Repairs, in one list (No Duplicates)	3.00 per M.
1,565	Auto Supply Jobbers	5.00 per M.

(All lists typewritten and show financial ratings, and are 1918.)

Complete List Auto Owners and Ford Owners $3.00 per M.

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Trade Circular Addressing Company
166 West Adams St. Franklin 1182 Chicago



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The Ever Watchful Guardian of Your Battery

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Dealers and Repair Men! Wake Up! This is the best selling accessory on the market.

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1646 West Walnut Street, Chicago

Gray-Heath Co., Exclusive Sales Reprs., 1440 Michigan Ave., Chicago

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Winter Driving Demands Strong Engines

THE MOTOR

which has stood the test of expansion and contraction with cylinders reground and equipped with perfectly fitted pistons and rings is a satisfactory investment.

WE SPECIALIZE IN

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And the Manufacture of

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We Have Standardized Prices, Send Us Your Work Now

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EST - 1897
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SCAIFE COPPER-BRAZED AIR TANKS

are positively guaranteed to hold air indefinitely without loss of pressure.

CAUTION

Do not confuse Scaife Copper-Brazed Tanks with the cheap Welded or Soft-Soldered Tanks made by others.

We Also Manufacture
SCAIFE GASOLINE STORAGE OUTFITS

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WM. B. SCAIFE & SONS CO.,
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SPECIALISTS IN MOTOR CAR WRENCHES

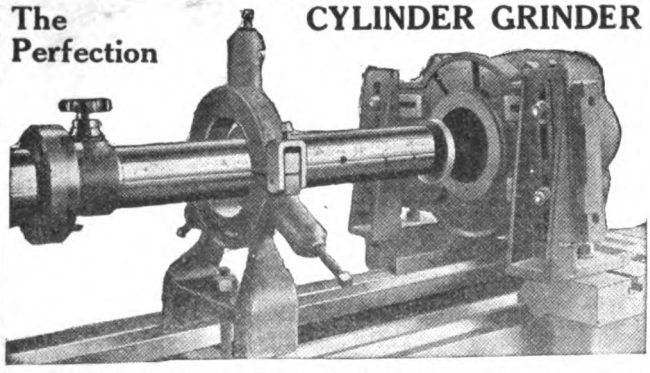
GUARANTEED SERVICE TOOLS

JOBBERS—DEALERS EVERYWHERE, ASK THEM

SEND FOR CATALOG No. 100.

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The Perfection CYLINDER GRINDER

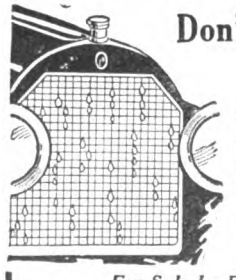


Can be attached to any ordinary engine lathe with a hollow spindle and a swing of fourteen inches or over. Descriptive literature on request.

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TRADE MARK REG. U.S. PAT. OFF.



Don't "Dope" a Leaky Radiator *Cure* it with Smooth-On

Radiators are made to hold water, *not chemicals*. Why take chances? Use SMOOTH-ON —an Iron Cement applied on the *outside*; it makes a *permanent* repair. For cracked water jackets and pumps, leaky manifolds, etc., as well. Literature on request.

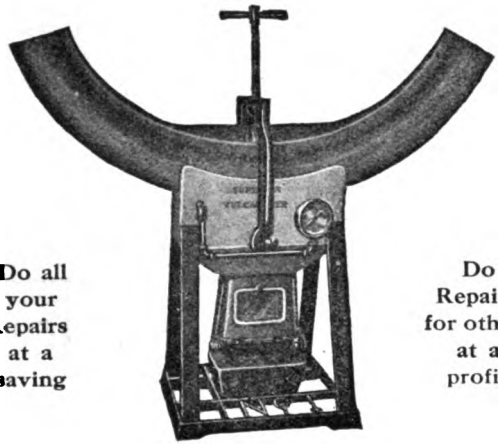


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Jersey City, N. J.

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A Real Vulcanizer
A Real Money Saver
Superior Vulcanizers



Do all your Repairs at a saving

Do Repairs for others at a profit

Write Now for Descriptive Catalog

Superior Vulcanizer Co.

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MONEY-MAKING MOTORS and BATTERY CHARGERS

USE HB BALL-BEARING ELECTRIC MOTORS



Wherever current is available, the electric motor is the ideal source of power for garage work, for machine shop or factory. HB Ball-Bearing Electric Motors are smooth-running, economical and efficient. Ample in capacity, sturdy and dependable. Easy to operate and require little or no attention. Built to save money and make money for you. Sizes to meet all requirements from ½ H.P. to 15 H.P.

Cash or Easy Payments

HB Ball-Bearing Electric Motors are sold for cash or on easy payments, with an absolute money-back guarantee of satisfaction, under which you run no risk. Send for prices and terms, stating machinery you wish to operate, current available, etc.

Big Profits in Battery Charging

Many HB owners are clearing $100 to $150 extra profit every month in charging auto storage batteries – some even more. So can you. This HB 500-Watt Charger will recharge 1 to 7 batteries at once, with current cost of only 12c to 15c per battery. Autoist pays 75c to $1.50. Anyone can operate and make big profits.



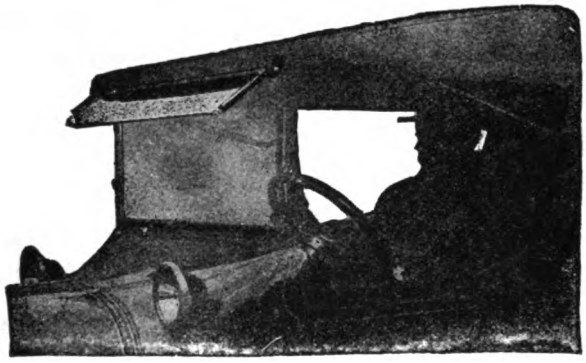
$15 Puts This Money-Maker in your Garage

Balance in 9 monthly payments of $20 each. Earnings should easily pay. Write for full particulars or send $15 first payment with trial order. Under absolute money-back guarantee, you run no risk.

Delay means lost profits. Order or write today

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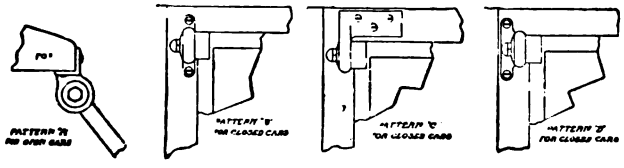
Box D-12 TROY, OHIO



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Price $10.00 Each

JOSEPH N. SMITH & COMPANY

DETROIT, MICHIGAN

With the arrival of

Superford HONEYCOMB RADIATORS



For Ford Pleasure and Commercial Cars, the Ford dealer is now assured of a high-class radiator, carefully constructed, that will render service efficiently and greatly improve the operation of the motor.

"Superford" Radiator Units are made entirely of brass

Model No. 16-F
For 1909 to 1916 Ford Cars. Made like the 1918 in two units with black detachable casing.
Price each, $30.00

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For 1917-1918 Ford Cars, made in two units, with black detachable casing.
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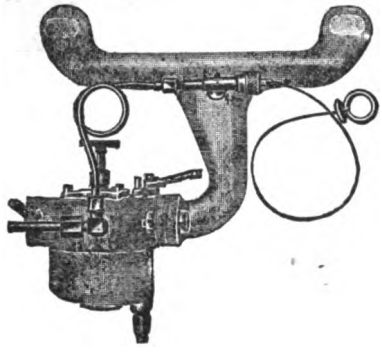
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The J. &. B. Gasoline Injector is easily installed — and always works. No change in motor, no cutting of dash, simple as a, b, c. Injects spray of gasoline into intake valve ports. Operated by small ring through radiator. "Starts her on one turn".

Price..... $3.50



The J. & B. Timer stands up – and always works. The rotor is so satisfactory that no change has been make in its design. Will outwear any other timers. Easily oiled through a patented dust-proof oiler. Simply constructed.

"Stands the test of time".

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A Nation-wide Authorized Service on Timken, Hyatt & New Departure Bearings at 22 Branches

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Over 750 Distributors

General Offices:
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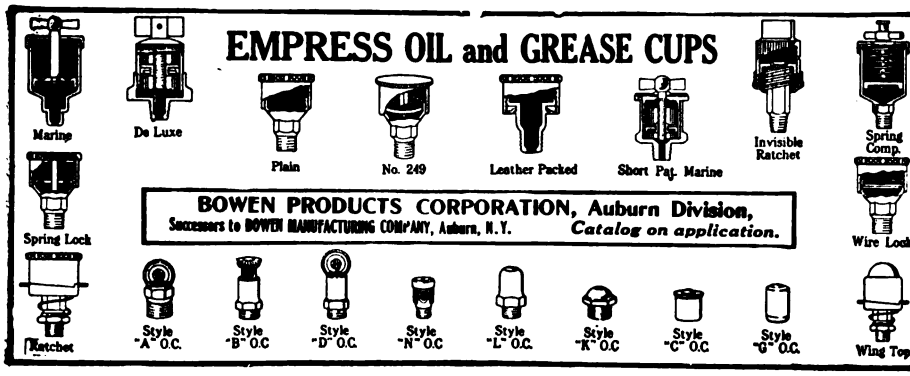
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FOR RADIATORS.

A new square tube honeycomb cooling section will make your radiator new again.

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Third Street, BRIDGEPORT, CONN.

Ball and Roller Bearings

New standard makes. All sizes and types in stock.

Send for prices, giving the number and name of bearing required, or tell us the name and model of car and where bearing is to be used.

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TES-TITE
PISTON RINGS

are made with an eye single to absolute technical precision. The highest—very highest in efficiency—but lowest in price for piston rings of their character.

Separate envelope for each ring with installation directions. Packed 12 in a box for the trade.

Write for literature.

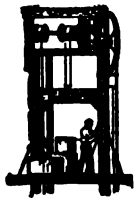
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It so markedly surpasses all other makes on the 5 vital points:—Easy starting in zero weather; Flexibility; Power; Simplicity; Economy—that it is becoming known everywhere, as "*The Leading Carburetor.*" Write for full particulars on Jobber's and Dealer's proposition.

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Automobile,
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It is a compact, portable motor-driven device capable of grinding perfectly the valves of internal combustion engines, in a fraction of the time usually required by hand methods.

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Grinds all makes of mowers perfectly in 15 minutes, without removing reel knives. Best money maker you can have in your shop. Nearly 10,000 in use.

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Offer a quick and ready means of connecting storage batteries for charging. Simply fit your connecting cords with these clips and snap them over the battery terminals.
No. 21-A—lead plated—1½" spread of jaws. Sample mailed postpaid for 15c in stamps.
Single Lots, Each 20c. Lots of 10, Each 15c. Lots of 100, Each 12½c.
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THE VICTOR HEATER FOR FORDS
THE ONE THAT SELLS ON SIGHT.
OVER 210,000 IN USE.
Get details in regard to prices, dealer helps, etc. *Write today.*
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PYRAMID BRUSHES
For Automobile Starting Motors and Lighting Generators
NATIONAL CARBON CO., Inc., Cleveland, Ohio

Knowlson's Spring Spreaders

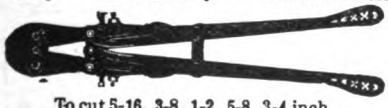


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BUMPERS
For Chalmers, Hupmobile, White, Mitchell, Oldsmobile, Studebaker, and the constantly increasing number of other cars with splash pan extended to the end of frame.
Write for prices on the whole line.
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KENNEDY AUTO STORAGE COVERS
Furnish efficient and economical protection for cars in dead storage. They are made of heavy, durable paper, in standard sizes to fit any cars.
MADE ONLY BY
THE KENNEDY CAR LINER & BAG CO.,
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PORTER'S BOLT CLIPPERS
"Easy" "New Easy" Allen-Randall



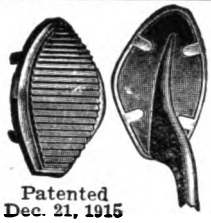
To cut 5-16, 3-8, 1-2, 5-8, 3-4 inch.
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AUTO SUPPLIES COUPON BOOKS
INEXPENSIVE. F. O. B. DESTINATION. SAMPLES FREE.
WE HAVE SOLD MILLIONS OF OUR COUPON BOOKS!
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saves gasoline and makes cold weather starting easier. It combines intake and exhaust so that exhaust heat dries incoming gasoline and vaporizes it perfectly. Result: smoother running, more power, more miles per gallon, less carbon. Price $9.00; West of Rockies, $10.00; in Canada, $12.50. Send for terms to dealers.
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Sales Dept., The Zinke Co., Chicago, Ill.



Patented Dec. 21, 1915

"PERFECTION" Pedal Pads
FOR EVERY MAKE OF CAR
Clamped on in less than one minute. No bolts, or drilling of holes in pedal necessary.
Send for free printed matter.
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Pocket edition booklet of valuable information to owners, chauffeurs, garage proprietors and their help. Free to those who write for it.
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WAGNER AUTO ENGINE CLEANER
One qt. kerosene and 6 lbs. air pressure cleans all dirt grit and grease from engine. Prevents wear, actually saves half the usual repairs. Quick, economical, thorough, easy and cleanly to operate. Necessity for repair shops.
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A&H TRUE THREADER AND VALVE REPAIR TOOLS
Correct All Conditions of Battered Tire Valves
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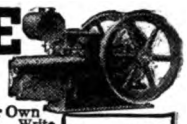
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WILL MAKE YOUR AUTOMOBILE JUST LIKE NEW

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Twice the Power at Half the Cost
Sizes 2 to 22 H-P.—Select Your Own Terms—Direct-from-Factory prices. Write your own order—Save $15 to $200. Prompt Shipment. Big new catalog, "How to Judge Engines" FREE—by return mail, Postpaid.
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These Profits For You
The Alamo Farm Power and Light Unit offers a sure opportunity for business building and profit making. Every farm a prospect. Send now for full details of our dealer proposition. Act quickly.
ALAMO FARM LIGHT CO., 1240 Farnam Street, Omaha, Neb.

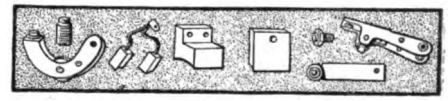
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Sells for $4.00
Worth the price of car

Is the "Standard" Ford Ignition Lock. Always demand the Defender and take no imitations. The Defender safely locks the coil box, and is the only lock that grounds the electrical system; this makes them thief proof. Insurance Companies require the Defender and allow 15% off on Insurance.
DEFENDER AUTO LOCK CO.
DETROIT, MICHIGAN



Automobiles and Trucks Give Better Service when
SUPERIOR
Ignition Repair Parts and Motor-Generator Brushes are Used
"They Last Longer But Cost Less"
Write for new Catalog
SPECIALTY MANUFACTURING COMPANY
641 Mass. Ave. Arlington, Mass.

TRY ONE



Easy to Apply
LIBERTY TOPS, Tailored to Fit
The best is none too good, if your top is worth recovering at all. The top is always the first part to wear out. Don't buy any old make-shift. Get our new catalogue with samples and prices of *New Tops, Top Covers, Seat Covers, Tires and Tubes.*
Liberty Top & Tire Co., 122 E. 8th St., Cincinnati, O.



Dependable—Efficient Economical
The automobile warning whistle that never wears out.
Write for descriptive circulars
Buell Manufacturing Co.
2984-86 Cottage Grove Ave., Chicago
Dealers, write for proposition at once

WHEN IN CLEVELAND visit the Famous RAINBOW ROOM
MABEL WINTON

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STORM

Tools mean prosperity for your garage

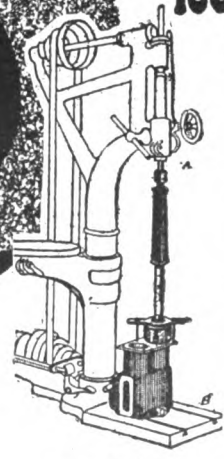
Repair business was never so good as now, BUT it can be much better for you if you will use STORM Garage tools.

We make a variety of efficient, time and labor saving, money producing tools, including the STORM Cylinder Reboring Machines, Storm Piston Vise, Storm Valve Port Renewing Outfit and Storm Connecting Rod Bearing, Reaming Jig and Straightening Gauge.

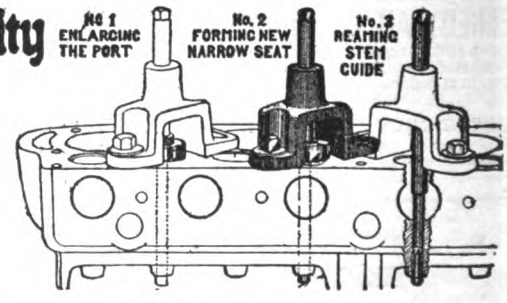
FOR SALE BY ALL LEADING JOBBERS.
Ask for copy of catalog No. 30.



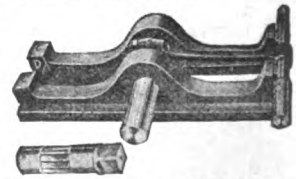
Storm Piston Vise



Storm Cylinder Reboring Machine



Storm Valve Port Renewing Outfit



The Storm Connecting Rod Bearing, Reamer Jig and Straightening Gauge

STORM MFG CO.

Dept. A26 THOMPSON, IOWA

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Delco

Starting, Lighting and Ignition Systems made by The Dayton Engineering Laboratories Company of Dayton, Ohio.

KLAXON



Warning Signals—made by the Klaxon Company of Newark, N. J.

REMY

Starting, Lighting and Ignition Systems made by the Remy Electric Company of Anderson, Ind.

Service Department Branches

When in need of a repair or the replacement of a part—the motorist has but one desire—to get the *correct* part, without delay.

Formerly it was necessary to get this service direct from the factory, but *now*, you can get direct factory service at the United Motors Service Incorporated branches.

This company was organized to handle the entire field service of the Delco, Klaxon and Remy organizations. Here you are assured genuine parts, and the service is rendered by expert factory-trained workmen, qualified to make necessary adjustments quickly and correctly.

UNITED MOTORS SERVICE

INCORPORATED

Service Department of the Above Companies

General Offices: **Detroit, Michigan**

Detroit
Chicago
Denver

Boston
Atlanta
New York

MOTORS SERVICE
TRADE MARK

Cleveland
Kansas City

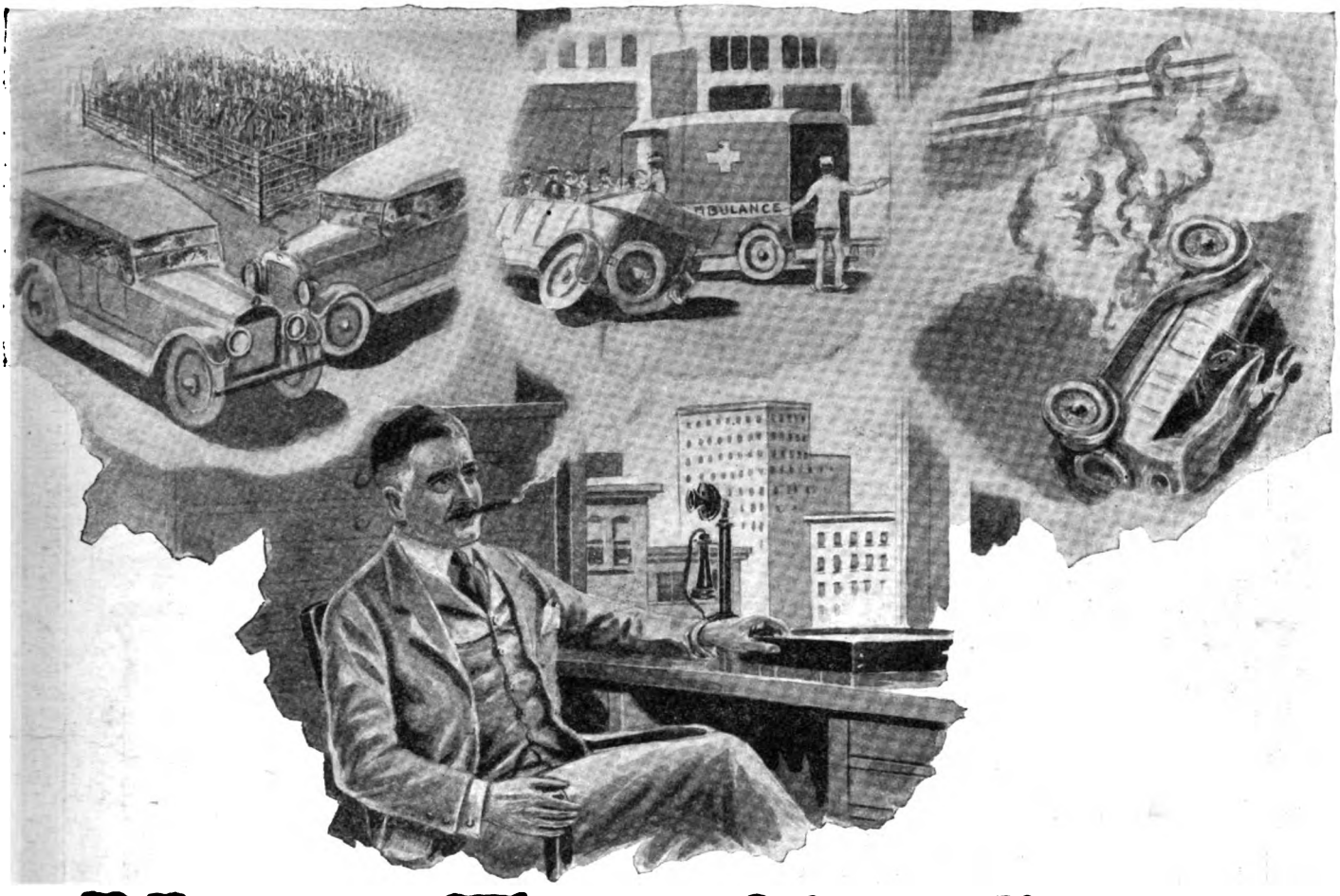
Minneapolis
Los Angeles

San Francisco

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Your Family Car—
Is it Safe?

IT'S hard to concentrate your mind on business, isn't it, when you think of the many terrible things that might happen to your family automobile ***and its passengers?***

Fast driving is responsible for three out of every four accidents you read about in the paper. Chauffeurs at their best are irresponsible and have a habit of speeding when not constantly watched. Perhaps your son or daughter does most of the driving—don't forget that they are more careful when you are along than when you are at the office. Youth is very self-confident and knows no danger, but one spurt of speed may result in a disastrous skid or collision.

For your family's sake, there should be a PIERCE GOVERNOR on your automobile. You can set and seal the governor for any desired speed and no matter who the driver is, or when or where your car is driven, it cannot exceed the speed you have designated. The governor can be reset for different speeds as often as you desire.

PIERCE GOVERNORS are not an experiment. They are now regular equipment on eighty-nine prominent makes of motor trucks and will soon be equally popular on passenger cars ***Governor installations must be made by the automobile manufacturer.*** When you buy your next car, demand that it be Pierce equipped. It will save you many a worry.

Literature Sent on Request

The Pierce Governor Company

"WORLD'S LARGEST GOVERNOR BUILDERS"

Anderson **Indiana**

PIERCE GOVERNOR

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Spring Service for A Nation.

VULCAN QUALITY

The Replacement Spring



VULCAN QUALITY AUTOMOBILE SPRINGS
IN STOCK FOR YOUR CAR

Sign and Display Rack FREE

The Display rack and Service Sign is Furnished **Free** with the first order, including appropriate advertising helps.

America's Motorists

have been educated by national advertising to look for VULCAN Service signs when in need of Spring Replacements.

Performance of VULCAN Springs on their cars has convinced them of the Superiority of VULCAN.

VULCAN Dealers

are profiting by the demand created through national advertising, combined with supreme quality of VULCAN Springs and convenience of VULCAN Service.

VULCAN Service

embraces the needs of both motorists and dealers, supporting each to the highest degree of efficiency. A constant stock of over 100,000 VULCAN Springs furnishes the source of supply. The individual supremacy of each spring, because of the "built in" quality, assures satisfaction to user and distributor.

Become a VULCAN Dealer and enjoy the benefits of a ready made market.

Write for particulars regarding VULCAN.

JENKINS VULCAN SPRING CO.
Richmond, Indiana

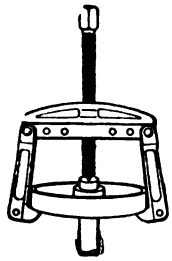
BRANCHES.

St. Louis, Mo.	1402 Chestnut St.
Minneapolis, Minn.	1024 Hennepin Ave.
Dallas, Texas.	209 S. Houston St.
Reading, Pa.	538 Franklin St.
Sumter, S. C.	29 Caldwell St.
Atlanta, Ga.	48 Auburn Ave.

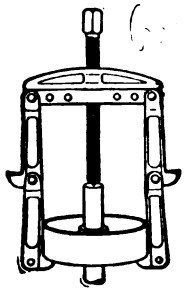
JENKINS VULCAN SPRING CO. RICHMOND INDIANA

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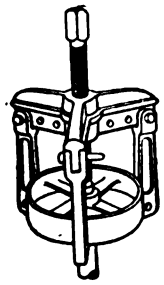
Increase the Usefulness
OF YOUR
CRANE PULLER
With this New Locking Arm
Absolutely Locks the Puller on the Work, making it a one-man tool



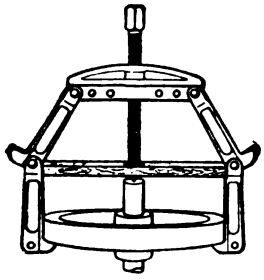
Two-Arm Puller removing work near end of shaft.



Work beyond reach of one set of arms.



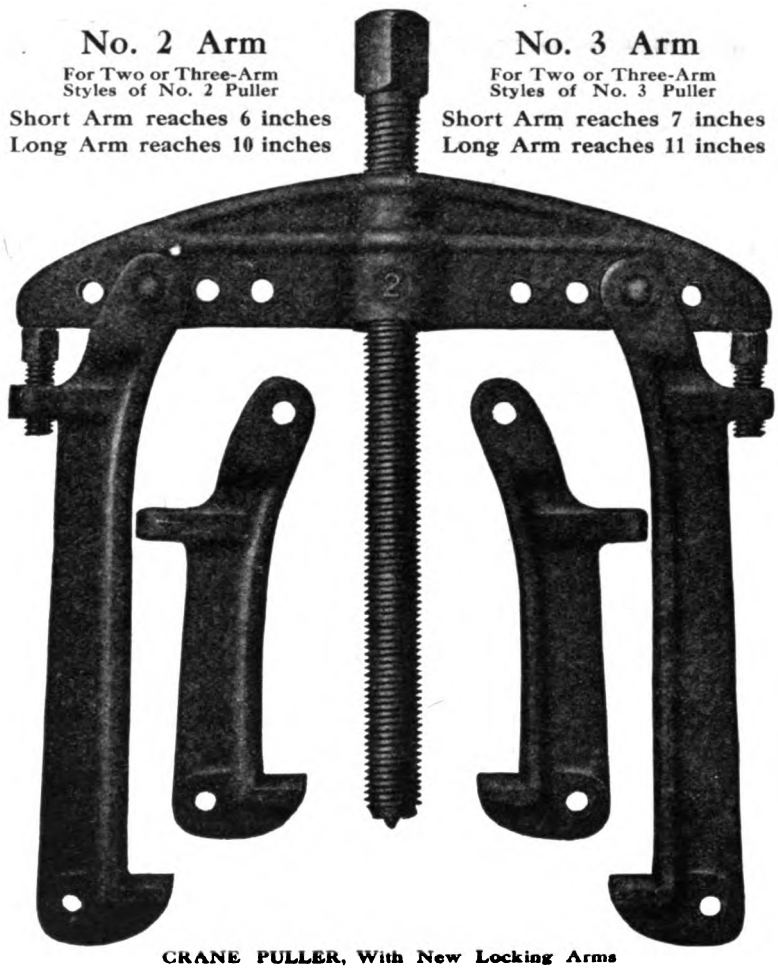
Three-Arm Puller pulling from three points will remove collars and work that cannot be started with the two-arm pullers.



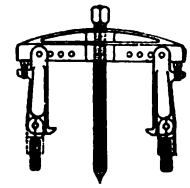
Two-Arm Puller on work of large diameter (a piece of wood being used as a spreader.

No. 2 Arm
For Two or Three-Arm Styles of No. 2 Puller
Short Arm reaches 6 inches
Long Arm reaches 10 inches

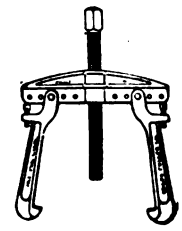
No. 3 Arm
For Two or Three-Arm Styles of No. 3 Puller
Short Arm reaches 7 inches
Long Arm reaches 11 inches



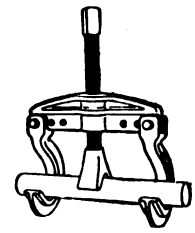
CRANE PULLER, With New Locking Arms



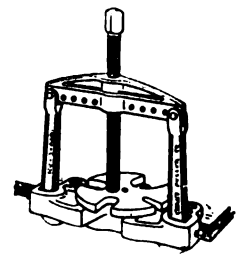
No. 0 Two-Arm Puller



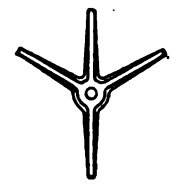
Patent Locking Arm



Pipe Bending and Shaft Straightening Attachment



Arbor Press Base



Crowfoot Beam

Pictures on both sides of page show different styles of Pullers and Attachments for a wide range of work.

Materials and workmanship absolutely guaranteed. We will replace any part that is defective, without question and absolutely free of charge, upon return of same to us.

Repair Season is here, write to-day for Price List or Order from your Jobber.

CRANE PULLER COMPANY
54 LAKE STREET - - ARLINGTON, MASS

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5-Ounce Bottle, enough to treat 50 gallons of gasoline.

$1.00

Quart Cans.....$5.00

IT IS WONDERFUL

how many more miles you can pull out of your gasoline by mixing with it a little

Oxigene
MOTOR AND DECARBONIZER FUEL SAVER

The highest honors in its class at the test of Motor Fuel Economizers, held by the New York Herald and the A. A. A., at the Motor Speedway, Sheepshead Bay, New York, Oct. 2, 3 & 4.

The Official Record Shows
A Mileage Increase Over 50 Per Cent
Oxigene Also Prevents and Removes Carbon
Guaranteed Harmless
No Ether, Picric Acid, Camphor, Acids or Corrosives

Send for free booklet, "Interesting Facts About Motor Fuel Combustion."

MILLER CHEMICALS, Inc., 346 West 26th Street, NEW YORK
Money Back, If You Find it Not as Guaranteed

BUNTING BEARING BRONZE B.B.B.CO. No. 1

THIS WINTER more cars will be overhauled than ever before. Be prepared for speedy work. Time is money. Bunting Cored Bars are same quality as in our finished product used by leading manufacturers. Get a supply now.

All Jobbers and Dealers

Ask for Catalog X

THE BUNTING BRASS & BRONZE CO.
740 SPENCER STREET TOLEDO, OHIO

CORED BARS

STOCK SIZES

Piece No.	Outside Diameter	Inside Diameter	Length	Approx. Weight
A	1	½	12	2
B	1¼	½	12	3½
C	1½	¾	12	5
D	1¾	¾	12	7
E	2	1	12	8½
F	2¼	1¼	12	10
G	2½	1½	12	11½
H	2¾	1¾	12	12¾
I	3	2	12	13¾
J	3¼	2¼	12	15½
K	3½	2½	12	17
L	4	3	12	21
M	4¼	3¼	12	20

STAR PRICES GUARANTEED

Every purchaser of Star Lathes during the year 1919 is guaranteed against any decline in present prices.

Should lower manufacturing costs, or any other cause, warrant a reduction in the prices of Star Lathes, rebates covering this reduction will be given the purchaser. A certificate to this effect accompanies each purchase.

Star Lathes have been made for the past 35 years by a concern known for its reliability, excellent manufacturing methods and superior products. Thousands of machine shops, factories and garages, as well as Government plants, operate Star Lathes for high quality work and low operating cost. These lathes perform the work of heavier and more expensive machinery and give excellent satisfaction.

Don't put off ordering that Star Lathe another day.
We protect you against any price decline.

Star Lathes are made in 9-in., 11-in., and 13-in. swing sizes. A full line of attachments available.

THE SENECA FALLS MFG. CO., Inc.

383 Falls St. **Seneca Falls, N. Y.**



BRUNNER Air Tanks
For Garage Service

IN ALL STANDARD SIZES ARE AVAILABLE FOR IMMEDIATE SHIPMENT. OUR TANKS ARE HEAVILY GALVANIZED, TESTED TO 300 LBS. AND GUARANTEED FOR 150 LBS. WORKING PRESSURE.

Write for Catalog No. 15, showing complete line of Brunner Air Compressors, Tanks and Fittings—and name of the Brunner jobber covering your town.

BRUNNER MFG. CO., UTICA, N. Y.

THE
ARMSTRONG MFG. CO.

BRIDGEPORT, CONN., U. S. A.
New York Office 248 CANAL ST.

like their products, need no introduction to the experienced steam or gas fitter.

To others, our Catalogue No. 14 will show why we are so popular.



"Makers of Genuine ARMSTRONG Stocks and Dies."

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S.O.S

TRADE-MARK REGISTERED

We guarantee that S.O.S. Battery Plates positively will not buckle or sulphate during the entire life of any S.O.S. Battery.

STORAGE BATTERIES

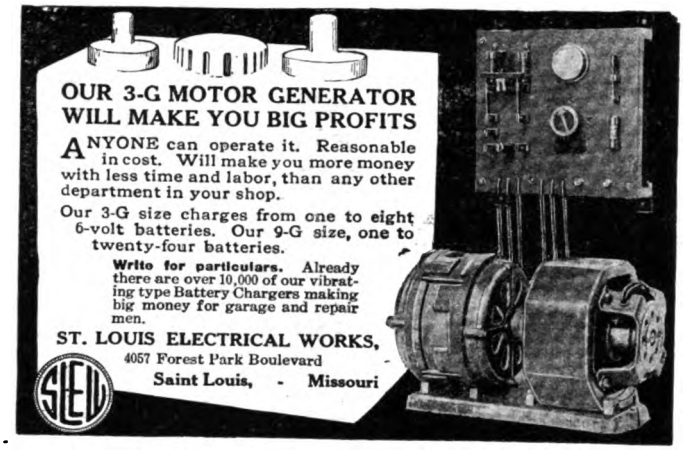
ARE WONDERS ON ALL CARS

BEST TO USE *BEST TO SELL*

Our Pocket Battery Guide lists the right battery for all cars, and for Farm Light Plants.

Our **Replacement Plates** fit other makes of batteries. Repairmen prefer S.O.S. plates because they are fully formed. Send for Replacement List and Guide.

VICTOR STORAGE BATTERY CO.
701 4TH AVENUE MOLINE, ILL.



OUR 3-G MOTOR GENERATOR WILL MAKE YOU BIG PROFITS

ANYONE can operate it. Reasonable in cost. Will make you more money with less time and labor, than any other department in your shop.

Our 3-G size charges from one to eight 6-volt batteries. Our 9-G size, one to twenty-four batteries.

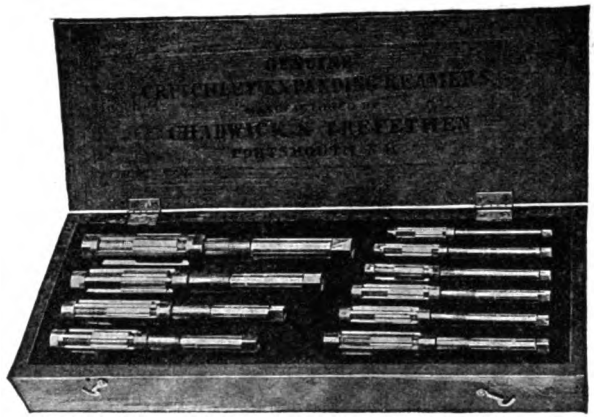
Write for particulars. Already there are over 10,000 of our vibrating type Battery Chargers making big money for garage and repair men.

ST. LOUIS ELECTRICAL WORKS,
4057 Forest Park Boulevard
Saint Louis, - Missouri

Genuine CRITCHLEY Expanding Reamers

(Trade Mark Reg. U. S. Patent Office)

Genuine CRITCHLEY Reamers have solved the problem of making oval holes round. They do the work of FOUR of the other kind at the cost of ONE. Simple as a Monkey Wrench.



Set of Ten in Hardwood Case, every possible size, 15/32 in. to 1-9/32 in.

Price $50.90

Critchley Automobile Cylinder Reamers

Finishes Smooth



Price $35.00

Critchley Cylinder Reamer

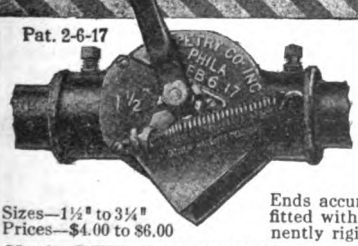
With this Reamer, two boys can finish an engine Block in half an hour. Made in sizes 3¼ in. and 3⅜ in. Taper shank furnished, if desired. Ask for circulars. For sale by your Jobber.

Insist on obtaining the Genuine CRITCHLEY, manufactured by

Chadwick & Trefethen - - - - - - 32 Bow Street, Portsmouth, N. H.

PETRY CUT OUT

Pat. 2-6-17



Gases expelled to the rear through patented flared opening, prevents all back pressure. Lever has seven adjustments, which make easy installation. Spring is away from the body of the Cut-out, does not absorb heat, has a simple tension adjustment and easy action, no strain on the exhaust pipe.

Ends accurately machined for pipe size and fitted with set screw, which insures a permanently rigid installation.

Sizes—1½" to 3¼"
Prices—$4.00 to $6.00

N. A. PETRY COMPANY, Inc., 1313 Race St., Philadelphia

DISTRIBUTORS: Gray-Heath Co., 1440 Michigan Ave., Chicago, Ill.
Norman Cowan Co., 433 Rialto Building, Chicago, Ill.

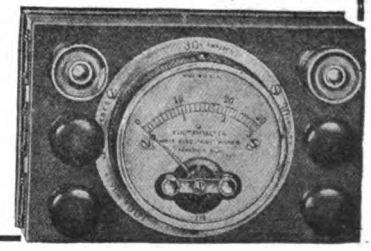


Any Man Will Take Off His Hat To *A GOOD IDEA*

THE HOYT ROTARY METER

gets entirely away from the old conventional style of Voltammeter in which it is admitted the methods are complicated, expensive and unreliable.

The Hoyt Rotary Meter combines so many novel features not found in any other meter that it marks a new invention in electrical measuring instruments. All the wonderful facts are waiting to be mailed to you—Please send your address.

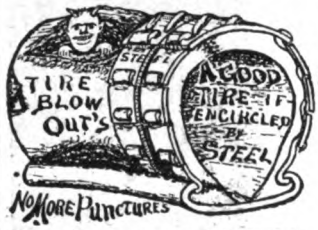


Hoyt Electrical Instrument Works
Penacook, New Hampshire

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Hang on to your old tires. They will last as long as you live if covered with steel. **The Kimball Steel Protector** makes **Blowouts, Punctures** and **Rim Cuts impossible.** A few sections will hold any old blowout. Tires as flexible as ever.

Special inducements to those in new territory.





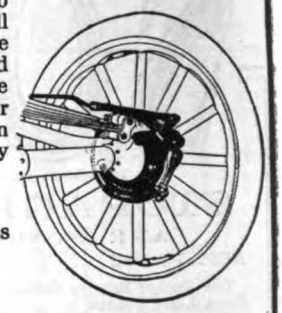


MUD CHAIN can be put on in a jiffy with one hand while standing on the run board. If you get in a mud hole you will laugh out loud. Hook the ends together and pull the little lever and they are on tight. Good for blowouts.

KIMBALL TIRE CASE CO., 174 Broadway, Council Bluffs, Iowa

PLA-SAFE EMERGENCY BRAKES

Are large Brakes, easily attached to the rear hub drums (No holes to drill and can be installed in less than one hour), lined with the best of lining and guaranteed to stop the car and hold the load on any hill, giving the Ford owner an Emergency Brake equal to any on the highest priced cars. Absolutely guaranteed to give satisfaction.



They Sell On Sight.

Dealers—Write today for Discounts and Big Selling Plan.

Shipping Weight 15 lbs.

Pla-Safe Company

Successors to L. A. Leathers Co.

BROOKVILLE PENNSYLVANIA

PRICE, $10.00 PER SET

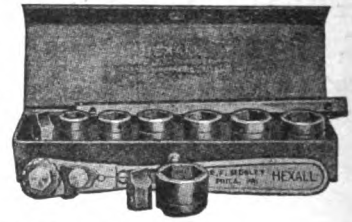
Break Any Sedgley Wrench and We Repair It Without Charge

Sedgley Quality is Your Guarantee of Durability

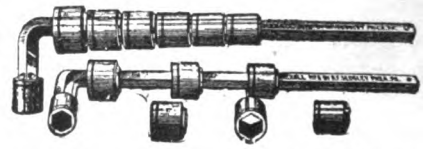
Get Your Order in Today

HEXALL WRENCHES SELL RAPIDLY and once in a while a dealer gets caught short—but that's no way to do business—to tell a customer that "you carry them but you are just out of them"—or in other words, you're making money but you don't get it in your hand—making profits in your mind isn't tangible enough to keep your business on its feet very long. Get that delayed order in to us to-day—keep your stock up!

"HEXALL" No. 2 contains—7-in. Steel Forged Handle, 2 Screw-Driver Bits, 7-in. Extension Bar, 7 Hexagon Sockets. Packed in neat, strong cloth case.



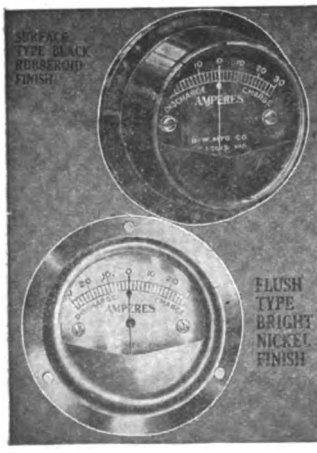
"HEXALL" No. 5. 10 inch Handle made from ½ inch Hexagon Steel, 7 Hexagon Sockets, with same range as No. 2 set. Sockets pack neatly on handle when not in use. Friction Ball prevents them from falling off. Can be used as an extension with wrench on short end.



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An Ammeter must register accurately at ALL times in order to fulfill the purpose of its installation. Furthermore, it is essential to appearance that the instrument conform to the finish and type of car in which it is installed, enhancing rather than detracting from its looks.

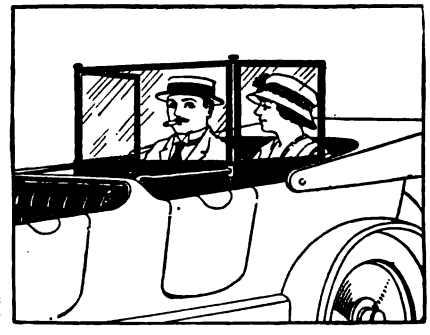
B-W personifies perfection in Ammeters. Accurate always. Made in styles to conform to any design or finish. A product of beauty as well as utility. Why install inferior Ammeters when the cost of the best is but little more.

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"J. H." TONNEAU OR Rear Seat Shield

FOR EVERY TOURING CAR



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The Comfort of a Limousine Minus its Cost.

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Dixon's Solves the Lubrication Problem

for you and your customers. Increased mileage and power—decreased upkeep. That's what makes motorists Dixon-disciples. And makes friends for the far-sighted dealers who sell

DIXON'S GRAPHITE Automobile LUBRICANTS

"The Graphite is the Reason"

Write for our interesting Dixon's Dealer's Deal No. 184-G

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D X N TRADE MARK **JOSEPH DIXON CRUCIBLE CO.** D X N TRADE MARK

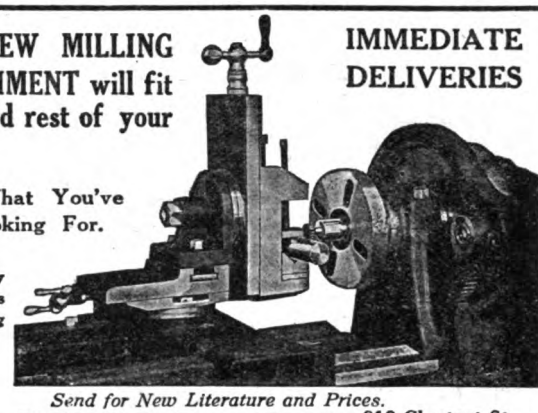
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Very Handy for All Sorts of Milling Jobs.

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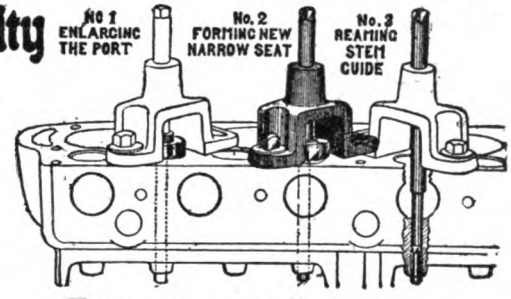
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Barnes Drill Co., Inc. 1907 818 Chestnut St., Rockford, Ill., U. S. A.

Builders of the All-Geared [illegible] and Gap Lathes.

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Tools mean prosperity for your garage



Storm Valve Port Renewing Outfit

Repair business was never so good as now, BUT it can be much better for you if you will use STORM Garage tools.

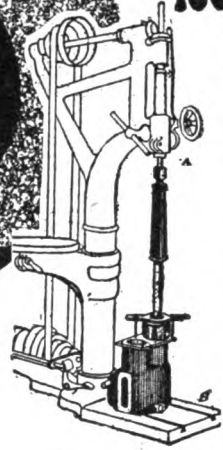
We make a variety of efficient, time and labor saving, money producing tools, including the STORM Cylinder Reboring Machines, Storm Piston Vise, Storm Valve Port Renewing Outfit and Storm Connecting Rod Bearing, Reaming Jig and Straightening Gauge.

FOR SALE BY ALL LEADING JOBBERS.

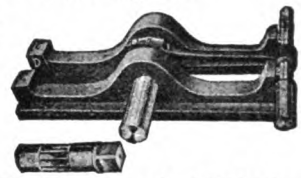
Ask for copy of catalog No. 30.



Storm Piston Vise



Storm Cylinder Reboring Machine



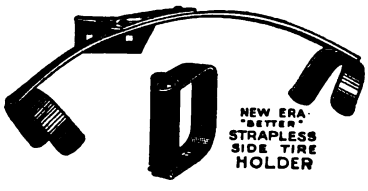
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STORM MFG. CO.

Dept. A26 THOMPSON, IOWA

NEW ERA "BETTER" STRAPLESS SIDE TIRE HOLDER

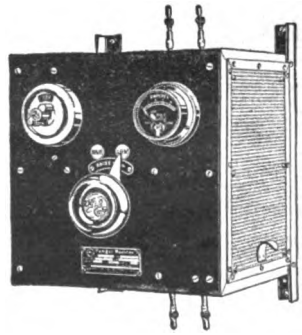
Made of steel, has no cast parts to break and no straps to wear out or be lost. The locking device is a part of the tire holder. Tire easily slips into place and is quickly adjusted. A convenient, light tire carrier that has many exclusive advantages. Self-expanding carrying rim can be furnished where demountable rims are not used.



Ask your dealer for New Era "Better" Strapless Side Tire Holders. Prices $2 to $3.

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Tungar RECTIFIER

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GENERAL ELECTRIC COMPANY

General Office: SCHENECTADY, N. Y. 35 A-3

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Cold weather means lower motor efficiency. If your motor is choked up with carbon, **you are wasting gasoline!** When you have the carbon deposits scraped or burned away, **you are pouring gasoline down the sewer,** because **Carbon is Power.**

Consume the carbon deposits with

CARBON-X

The Guaranteed Carbon Consumer

Thus **utilizing** the wasted power, and then **keep your motor clean** with a small application of Carbon-X every four or five hundred miles. **Don't throw away gasoline!**

Carbon-X positively **will not injure** the interior of any motor, nor affect the lubricating oil in any manner.

DON'T "LAY UP" YOUR CAR—DRIVE IT!

Carbon-X is made only in tablet form, and is packed 30 tablets in a screw-top carton. It is handy to carry in the tool box, and simple and easy to use. While the motor is warm, remove the spark plugs and insert the desired number of Carbon-X tablets in each cylinder according to directions on the carton. Replace the spark plugs and **drive the car.**

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MR. DEALER: To save time, order a dozen cartons of Carbon-X direct, giving us instructions to bill through your jobber. Initial order will be shipped prepaid.

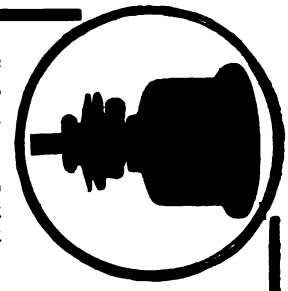
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Ask for our unusual book—WHY IS CARBON?—it's free.

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between what seems to serve and what really does serve is now measurable because you have a standard starting point.



Any old thing as a clutch seemed to be good at one time until we took the "see" out of seemed and put it where it belonged—in

The "Evans" Model

"HELE-SHAW" CLUTCH

(It is Patented)

The "Hele-Shaw" Clutch (for motor cars and all other mechanical drives) is the result of constant experiment and experience—a costly and aggressive initiative to prove that none of us need stay in a groove—that efficiency in a clutch could be obtained by looking at the whole idea as a coveted attainable prize worth winning.

Our "Hele-Shaw" Clutch was exclusively specified by the United States Government for use in three-ton Artillery Tractors. Thousands of "Hele-Shaw" Clutches are standard equipment in four-wheel drive Government Trucks.

In theory, design and actual results gained, it is undoubtedly unique in the art and the most advanced to date. For the best—the very best results, we believe it advisable for clutch users to employ these

CERTAIN AND SETTLED RESULTS

in their work instead of risking the old, or untried fields. Make us prove it—write for full particulars and catalog.

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NEW YORK PHILADELPHIA WHEELING
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You have calls for something to start cold motors; you'd have many more if customers knew you had "Flash." Flash starts motors on the coldest Winter days—*and these are the days it sells.*

Flash Starting Fluid is a new



WONDER WORKER

Specialty that starts **any** engine the first turn over. It makes no difference how low the temperature, or how poor the gasoline—*Flash will get action!*

Flash saves the batteries of the self-starter for the man who owns the big car, and it saves the struggle of cranking for the man who owns the Ford. Requires only a few drops squirted through pet cocks or spark plug openings.

Ask for catalogue of the other WONDER-WORKER Specialties when you write in for quotations on "Flash." The WONDER-WORKER line offers you many such leaders.

THE HALL-THOMPSON CO.
HARTFORD, CONNECTICUT

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Looks Like a New Top

Give the old top a few minutes attention. Brighten it with

"F-S" "Evernew" Auto-Top Dressing

It brushes on easily and dries quickly. It is waterproof and pliable.

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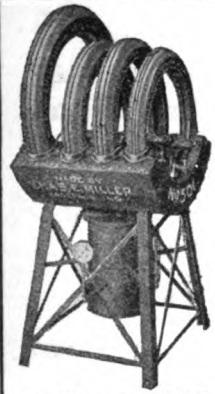
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Mfrs. of Colors, Paints, Varnishes since 1863

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"Evernew" Auto-Body Enamel in eight standard colors. Special shades to order. (18-5)



4-Cavity En Bloc Retreader places ribbed tread, all sizes casings, 2½ to 5½ inches inclusive.

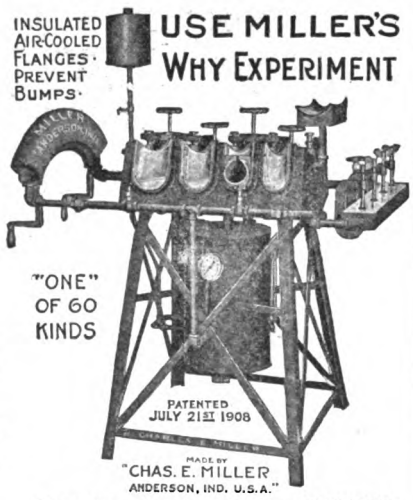
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Miller's Vulcanizers are Standard

Wrapping machines and all supplies.

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Why Experiment?



Gas Burner $195.00

Extra Ply Tires & Tubes

Best Quality Lowest Prices

Sales repeat for Exclusive Jobbers

More Fabric Means Less Blowouts.

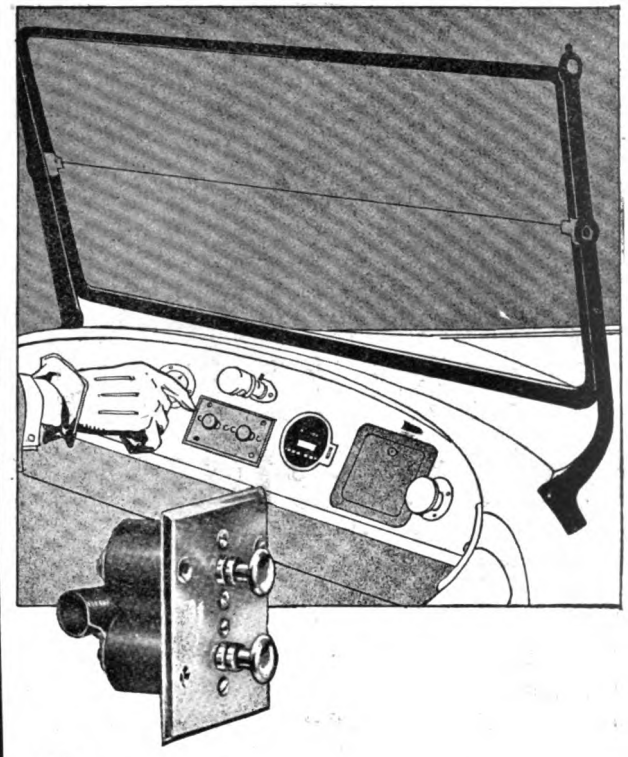
Free — new 84 page "Red, White & Blue" catalog and tire prices for the asking.

Complete Gasoline Burner $168.00

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TYPE "C" DIMMING SWITCH

THE man who desires to be able to dim the lights on his car—

But who hesitates because of the necessity of re-wiring it—

Will find in the Connecticut Type 2N with "C" resistance Dimming Switch the simplest and most satisfactory solution to his problem.

Here is the one switch which accomplishes its purpose without requiring the slightest change in the wiring of the car—

Pulling out one button puts on the headlights and the tail light—

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The position of the second button, however, determines whether or not the headlights are burning full or the current going to them is being choked and their light dimmed by the resistance coil.

We also make a series dimming switch—Type "D"—for use in conjunction with another switch.

This switch has no "Off" position. When the button is in, the lights are in multiple and are bright, but when the button is out, they are dimmed by being thrown into series.

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(PATENTED)

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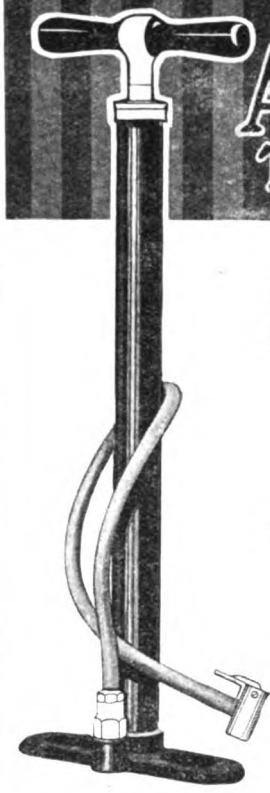
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BUILT IN FOUR STANDARD SIZES

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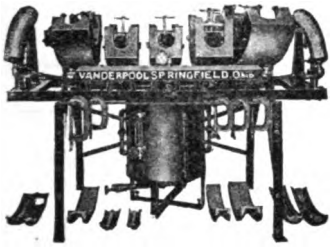
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The Vanderpool Vulcanizer

repairs tires upon correct principle exactly as used by the big tire factories. Vanderpool work stands up better and longer. We send you same outfit now used by veteran repairmen.



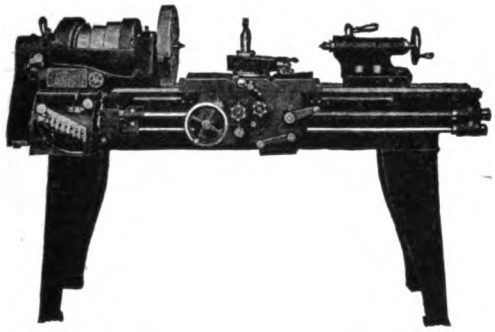
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Tire Repairing Manual

Tells How Tires Are Repaired.

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The Wm. Vanderpool Company, Springfield, Ohio



14"x6' Monarch Lathe

Other Sizes, 16, 18, 20-Inch

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Monarch Lathes are low in price and within the reach of every garage owner. They are used in every class of work from the finest toolroom work to production work in the largest factories.

Furnished with taper attachment, milling, keyway cutting and gear cutting attachments, and other attachments useful in the Auto Repair Shop.

Send today for catalog No. 11 and prices

THE MONARCH MACHINE TOOL CO.
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MORE MILES PER TIRE

LESS TIRES TO BUY

THE Fisher PATENTED "RIM-GRIP" SUB-CASING

The Blows That Your Tires Receive, When You Strike Objects in the Road, Leave Weakened Places in the Fabric

A TIRE IS AS STRONG AS ITS WEAKEST POINT

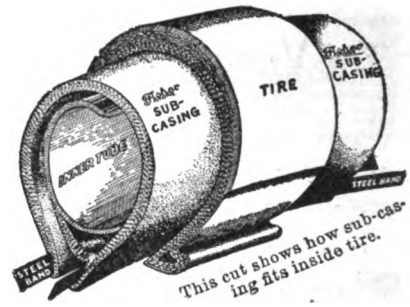
The weakened places are hard to detect now, but will result in blow-outs later.

RIM-GRIP SUB-CASINGS reinforce the fabric of the tire at all points from bead to bead. They make a partially worn tire stronger than it ever was. It can be worn out completely and the sub-casing used in another tire. As the cost of equipping a car with new tires is much greater than last year, it will pay you to investigate Rim-Grip Sub-Casings.

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FISHER MANUFACTURING CO.

1706 Payne Avenue **Cleveland, Ohio**



This cut shows how sub-casing fits inside tire.



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METALLURGICAL AND ELECTRICAL LABORATORIES

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We wish to ANNOUNCE

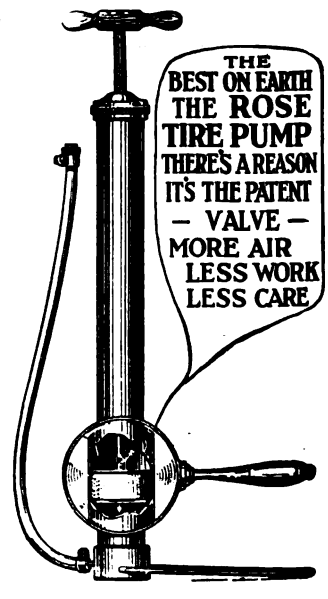
that we now do all kinds of expert armature rewinding

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Over 1,000,000 Satisfied Users —OF— ROSE TIRE PUMPS

4,000,000 More Need Them

Rose Tire Pumps have the largest sale of any tire pump in the United States. **Rose Tire Pumps** pump more air with less repair. Heavy steel barrel, polished inside, 5-ply hose, **patent valve** admitting the air through the rod into the chamber without disturbing the cupped leather.



Every Rose Pump is given **three** separate and distinct tests before leaving the factory.

1¼ in. Rose Tire Pump	1½ in. Rose Tire Pump
$3.00	**$3.50**

Electros for your 1919 catalog. 3-color insert with your imprint.

J. H. HANEY & CO.
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Manufacturers of
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METAL HOSE AND TUBING CO., BROOKLYN, N.Y.

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FOR THE
WOODRUFF SYSTEM

For the benefit of dealers, garages, and repair men, we are prepared to furnish our keys put up in two assortments. Every garage and repair man should keep these on hand. They may be purchased from the leading jobbers or ordered direct from the factory.

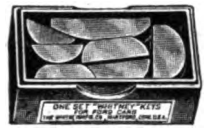


Regular Assortment

One hundred keys of the sizes most likely to be required for repair work.

Ford Assortment

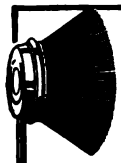
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A few of the exclusive features which you will not find in other makes of Timers:

Patented Oiling Device.



Roller revolves on a hardened bushing and not on a soft rivet pin.

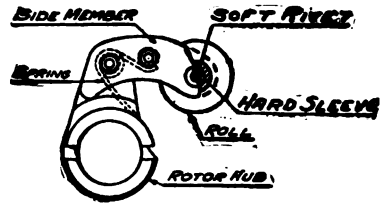
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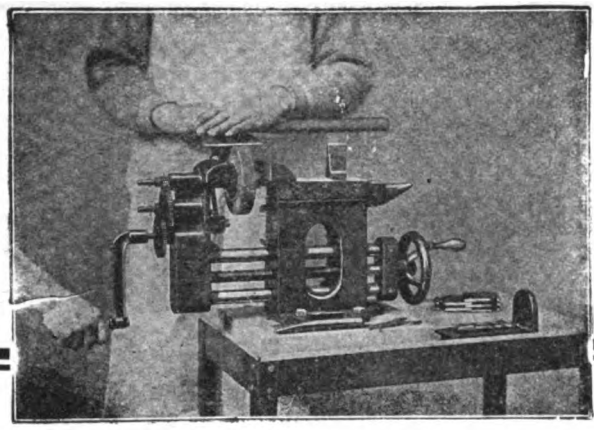
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It's a complete repair outfit. Includes strong practical anvil; powerful vise up to 4¼ inches; a sure-grip steel pipe vise; corundum grinding wheel, 5 inches by 1 inch; a two-speed drill press, with 2 drills; a metal cutting wedge and driving mechanism of three speeds—direct, 4 to 1 and 16 to 1—easily regulated by changing handle grip. It operates grinding wheel, buffing wheel and many other similar tools. All for $16.

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Those three Letters, **S-M-C**, on the roll assure continuous, satisfactory service—look for them.

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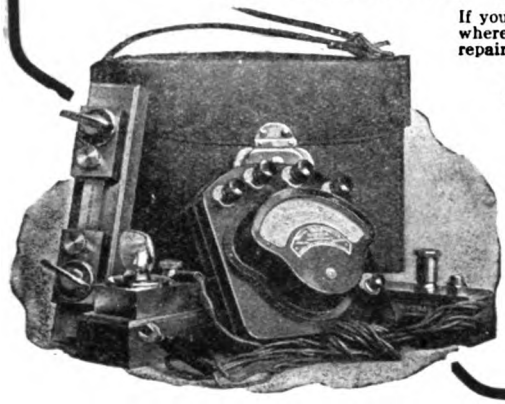
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Gives Results No Other Ring Can
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Bulletin No. 4—Special

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With "NO-LEAK-O" SPECIAL in the bottom groove (See illustration, Letter C), the oil which will cling to the cylinder wall is trapped in the groove by the square edge catching it, forcing it back into the oil pit.

"NO-LEAK-O" SPECIAL should be used in bad oil-pumping motors They will keep the oil down when other rings fail.

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Price $1.00

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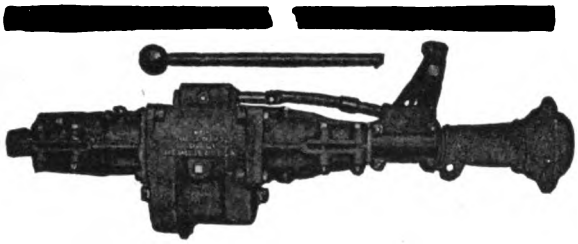
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For FORD WORM-DRIVE TRUCKS

Underdrive type Doubles the Power	Overdrive type Increases Road Speed 40%

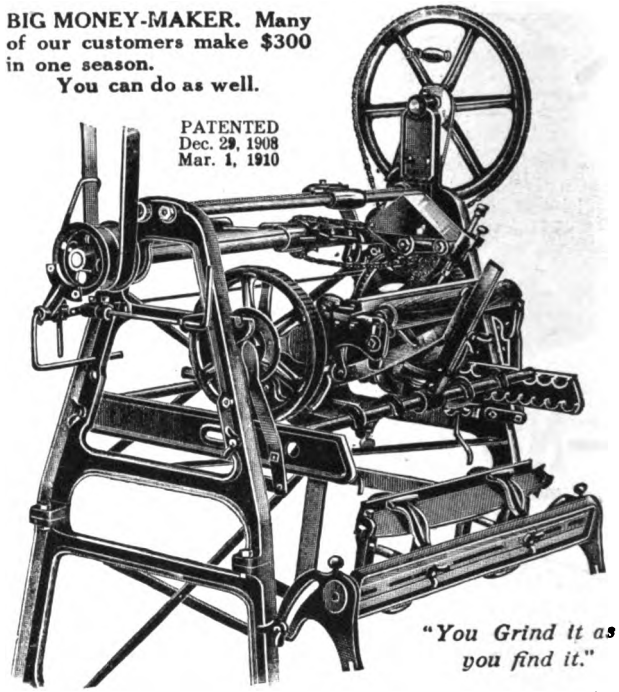
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BIG MONEY-MAKER. Many of our customers make $300 in one season.
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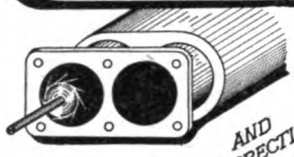
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GEARS and SPROCKETS

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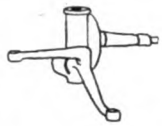




WE CAN DUPLICATE ANY MACHINE PART OF YOUR CAR, DOMESTIC OR FOREIGN.





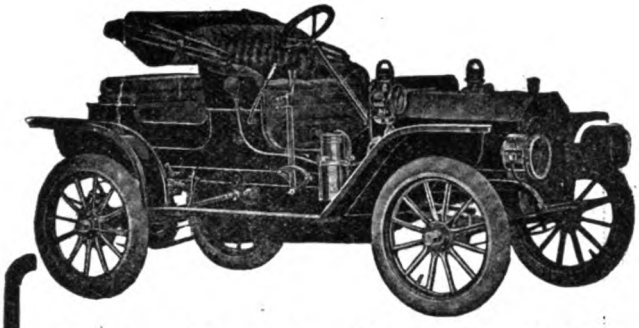


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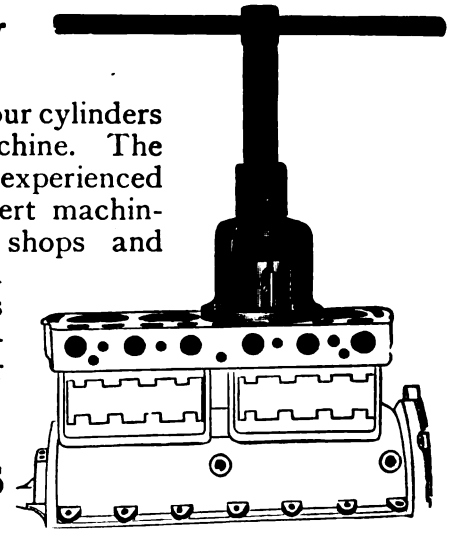


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Increases the Earning Power of Your Shop



ONE MAN can rebore a set of four cylinders in sixty minutes with this machine. The tool centers itself, and an inexperienced man can do as good a job as an expert machinist. With this tool, the smaller shops and garages can rebore cylinders and guarantee the work to be as good as the larger dealers with their expensive machinery. Makes the motor better than new.

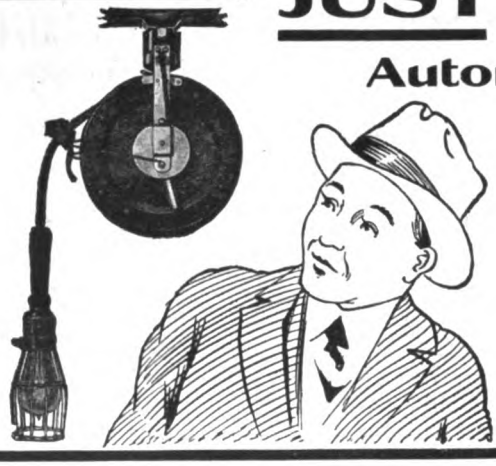
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Tisn't a half-baked proposition nor an amateur outfit—but a splendidly strong Extension Reel for men who haven't got time to bother with any nonsensical makeshift. Equipped with 25 feet of reinforced cord. It's all good quality—don't cost much either. Approved by the Underwriters.

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Over 3,000,000 Feet on Hand.

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ALSO COLD DRAWN SEAMLESS TOOL STEEL TUBING

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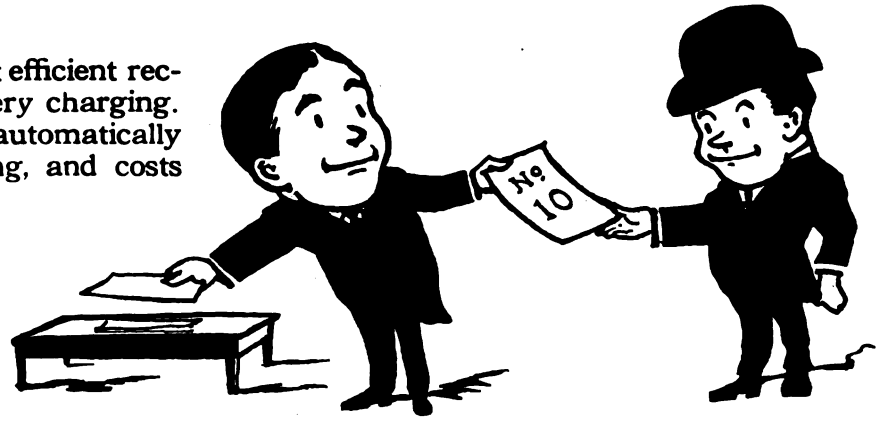
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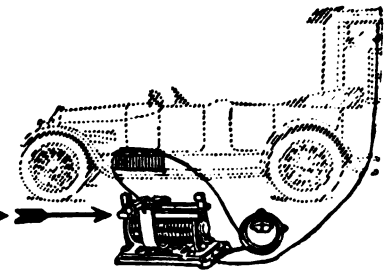
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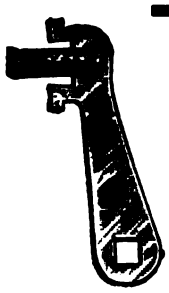
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one and two piece



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Controller Installed on Akron-Williams Mold



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Will positively hold air indefinitely without loss of pressure.

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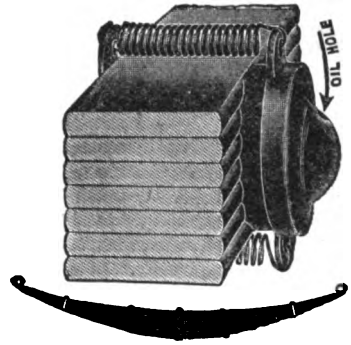
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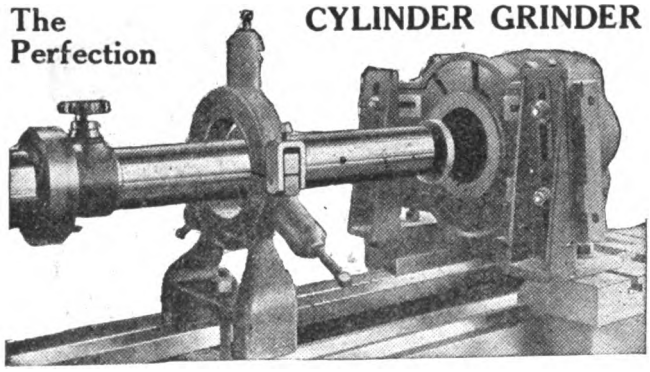
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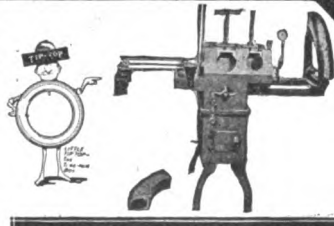
New Type-F Equipment

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55,967	Auto Supplies, Retail, U. S.	3.00 per M.
45,054	Repair Shops	3.00 per M.
404	Auto Manufacturers	3.00 per M.
73,674	Auto Dealers, Garages, Supplies and Repairs, in one list (No Duplicates)	3.00 per M.
1,565	Auto Supply Jobbers	5.00 per M.

(All lists typewritten and show financial ratings, and are 1918.)

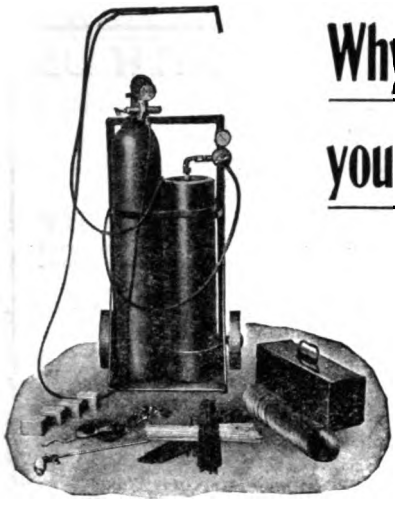
Complete List Auto Owners and Ford Owners $3.00 per M.

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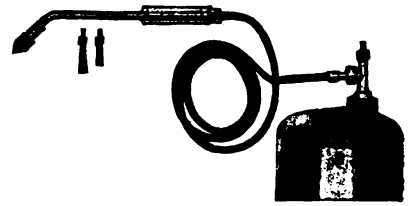
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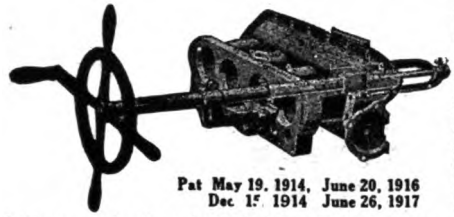
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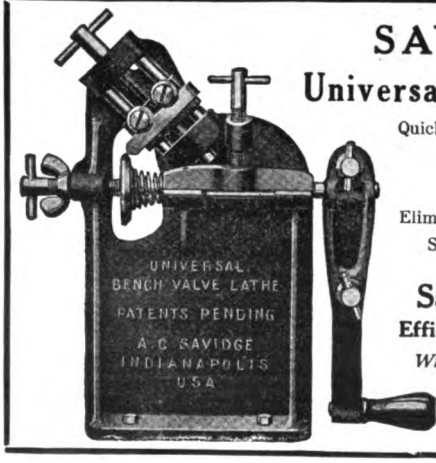
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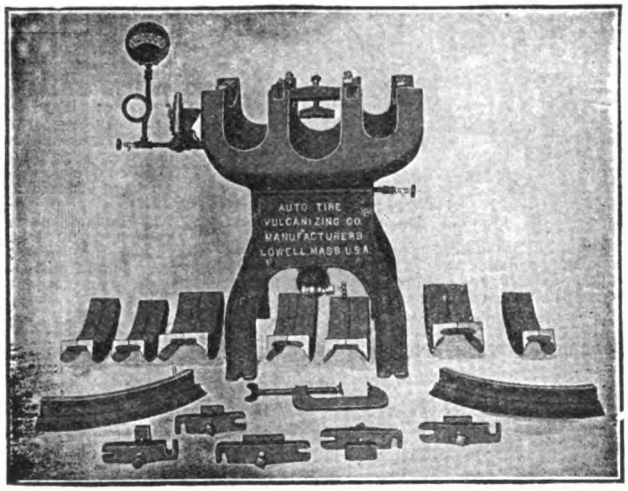
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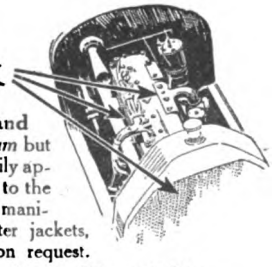
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Why Does She Stop?



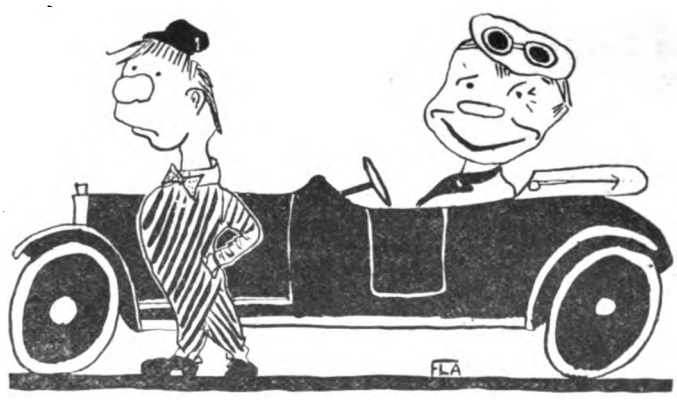
With a faltering pencil and a beating heart, I dash off this heading. I am taking my life in my hands; I am venturing upon an unmarked trail; I am sailing upon uncharted seas. In every book store I find volumes entitled "What Makes the Car Go?"; "Inside the Engine"; "How to Run an Automobile," and similar books; but to the best of my knowledge and belief, so help me Muse of Motordom, there is no work to be had which tells why the car don't run.

Mayhap or possibly there has lived a fearless author, who has ventured upon this work, but as he progressed, doubtless he has lost heart and finally consigned his unfinished manuscript to the scrap basket, never more to be the jaunty soul of the past.

There is one thought that cheers me, in compiling this story. Never yet have I seen anyone who gave a plugged nickel, a tinker's dam, or any of his loose change to find why his car went; he is satisfied, and well he might be, with the result; he holds his breath and only hopes that she will continue to "went" and not change her tense and be "gone."

AN advertisement in one of our popular magazines informs us to the effect that even a mere child can answer any of the appended questions, provided he has had the opportunity to consult a certain book of useful information. Among the questions I find "What makes the car run?"

Sure he can answer the question; one presses a little button, pulls down a lever, whispers a few words of encouragement, and presto! she goes. Maybe she doesn't go satisfactorily, but go she does, after a fashion. BUT, when she stops! Who is there who can give the reason? I still wait for an answer. An automobile and a mule are two souls that beat as one — this simile doesn't sound just right, but the fact remains. When they go — they go — and when

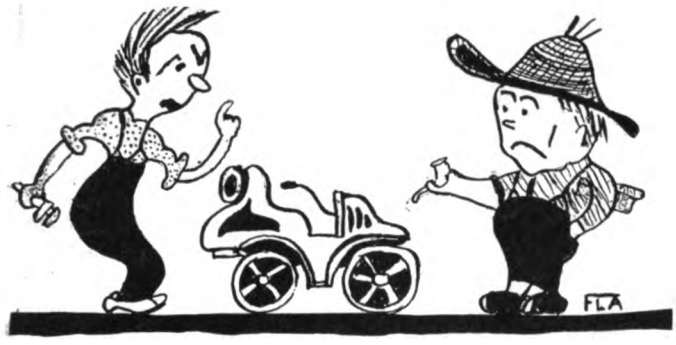


When She Goes, Nobody Cares Why—Everybody's Happy.

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they stop—well, they just won't go, and no amount of sympathy, harshness, or force will accomplish the impossible unless one knows the mystic words which charm away the inherent stubborness of mules and cars.

Back in the good old days, when automobiles began to chug upon the highways, and fill the air with fumes of gasoline, cylinder oil, and profanity, I remember an old farmer who was a "jack of all trades." He pro-



"Our Hero Was on the Spot—Hometown Paper Under His Arm—Ready To Earn An Honest Dime."

fessed to be something of a veterinary and something of a mechanic, and so he combined the two, after a fashion, and hung around the village store, lying in wait for discouraged and disgusted motorists.

"Ca Chug, Bang," would go a dying engine, and our hero would hie himself to the spot, pipe in mouth, and look wise. Sooner or later the puzzled autoist would raise his eyebrows in a question and remark "whassa matter?"

This was the signal for our friend. Forth from a voluminous coat pocket, or from beneath his arm, he would draw the latest copy of his home town newspaper and while the motorist turned his back (the work was mystic, you see, and our friend took no chances in giving away his secret), the farmer would painstakingly wrap up each dry cell in the paper. After collecting a dime for the work, the farmer would crank the machine and away it would go, like a mule who has the prospect of a full meal at the end of his journey.

The day of dry cells has passed, the mysterious storage battery has taken their place, the farmer long since has dropped into obscurity, but the big problem still remains —"Why does she stop?"

It is the question of the ages; from Alaska to the tip of California; from Labrador to Florida; vice versa and criss-cross run those little crinkles and question marks. Why, when a' nauto is given the best of nourishment, a bath once a week, a regular manicure of its tires, and a careful massage of its upholstery (occasionally or oftener), should it be so ungrateful as to go on a strike, like a dissatisfied labor union?

When a person dies, their demise is caused either by starvation or failure of their nervous system. So it is with the automobile; give it proper nourishment and don't let its "nerves" fail, and it is a thing of life. Cut off its steady supply of gasoline or forget to throw on the switch and it will no more exert itself than a torpedoed U-boat.

For the purpose of demonstration let us climb into our little flivver and journey into the country. We will pick out a road seldom frequented by autoists, one that leads us away from civilization and the gaze of the maddening throng. For two hours at a stretch we are lulled into a feeling of security, our engine purrs like a contented kitten and acts like a contented horse.

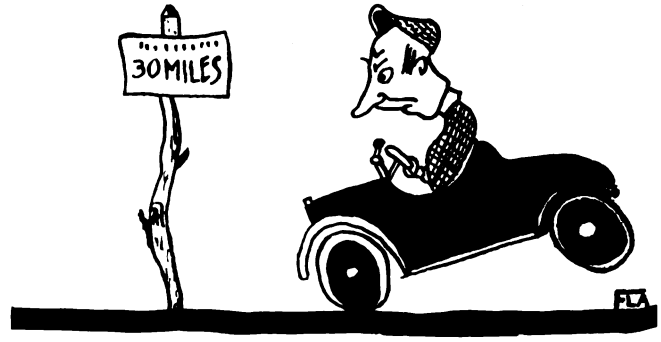
Ha! a signboard, upon which is inscribed "Scituate 30 miles," the flivver stops to read and having absorbed the information curls itself into a ball, just like that same contented kitten we compared it with in the last paragraph, and goes to sleep. It is always this way, when one is 'steen miles from anywhere; that's why I suggested the trip, just so that we could look for the answer to our problem, "Why won't she run?"

Let's go at the work systematically now, no—don't bother to crawl under the thing, you can work better from the top, unless you want to turn the car over. First, let's see if there is any gasoline in the carburetor. Unscrew that little cap over the inlet valve and see if you can press down on the float lever. No? Well then, you know that the carburetor float chamber is full of gasoline. Just open the drain cock in the bottom of the float chamber and draw off about a teacupful of the stuff.

Stopped up? Well, take a piece of wire and poke it out, then draw off the dirt. Maybe there is dirt in the needle valve. If you draw off the gasoline once a month you won't have that trouble. No, don't waste any time cranking her now.

Fill those pet-cocks with gasoline. Whoa! I didn't say open them and pour in a quart to each cylinder. One teaspoonful is plenty and a priming cock holds just enough. If you hadn't had those priming cocks, I would have made you remove the spark plugs from two cylinders and primed them through the top.

Push down on the starter button now and let's see what happens. Once is enough, don't think you have to



"Having Absorbed This Information the Flivver Calls It a Day—and Quits."

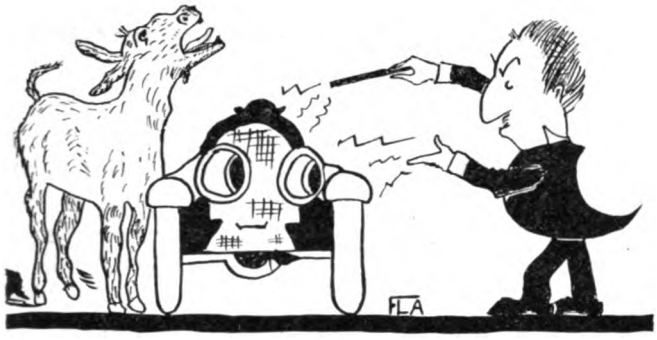
hold it down for half an hour unless you want to crank it by hand when the storage battery fails. Still asleep.

Now suppose one of you fellows removes the secondary wire from number one plug. Hold it about an eighth of an inch from the cylinder head. Try her again.

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Sure, you've got to throw on the ignition switch. Now, believe me! If you hold that secondary wire that way, with your bare hands, you'll learn quite a few facts about electricity. Hold it by the insulation, not by the brass tip.

Don't get a spark in that cylinder at all, do you? That shows there is something wrong with the ignition system. We know that the engine has gasoline, for we fed it directly into the cylinders. But we know it doesn't get any spark. Let's look at the storage battery. Connections all tight. Probably would be all right if the start-



"Unless One Knows the Mystic Words Which Charm Away the Inherent Stubborness of Mules and Cars—She Won't Go."

ing motor worked all right. See that little wire that connects with the starting switch and runs to the dash. Tighten up the binding nut and chase it out, see that it doesn't ground at any point, see if it is broken.

Just turn on the lights a minute. O. K. That shows that everything is right as far as the dash. Now let's look at the ignition switch. Contacts all good, sorter looks like—a bit of a puzzle, doesn't it? That's always the way a car acts when it knows that the nearest phone is ??? miles away.

That ignition system is what we call a single coil affair. One wire leads from the ignition switch to the coil, through it to the breaker box, and the current grounds inside the breaker box when the points are together and goes back through the frame and ground to the battery. Throw on the ignition switch and disconnect the wire leading to the breaker box from the coil. Touch it against the cylinder head. See that spark? That shows that the trouble is in the breaker box or connections.

Just for the fun of it lets connect the wire to the breaker box again and turn the engine over until the points come together. But we'll just slip a thin piece of paper between the points to break the circuit. Now one of you remove the secondary wire from the center of the distributor and hold it about a quarter of an inch away from the cylinder head. Now when I remove this piece of paper, I'll let the points come together for a second and snap them apart with my fingers rapidly; there should be quite a spark from that secondary wire. Let's try it. Nothing doing!

Just notice that the breaker points hardly come together. The things have burned away until they don't contact enough to make a spark. Now we will just file them off with a fine file until their faces are perfectly flat, then adjust them closely enough so that they will touch when the roll has traveled to the low part of the cam. Then we will turn over the engine until the breaker arm is on the top of the cam and the points fully separated. We'll readjust them so that they are apart about the thickness of a visiting card. If this is too far apart, they won't touch at all, and we'll have to adjust them again, just a little closer, until they touch when the roll is at the lowest part of the cam. Adjustments in different cars differ.

In the main and as a rule the visiting card answers the purpose. But always remember, the points must touch every time the roll travels into the valley of the cam.

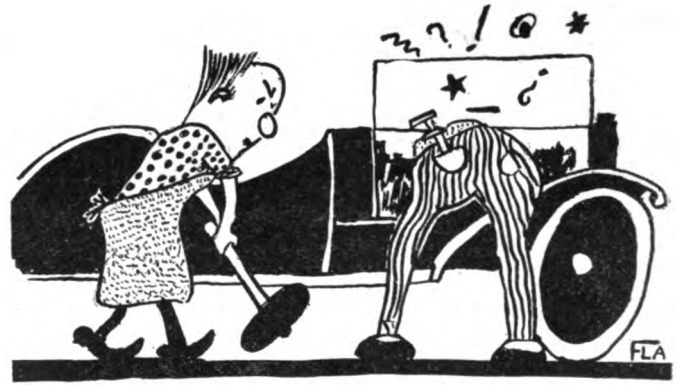
Now we'll put the wires back, just as we found them. Crank her up, Percy, she goes like a top. You see how easy it is to find trouble in a single coil, grounded wire system.

* * *

No matter what kind of a car you happen to drive: when the thing stops, find whether the trouble is in the gas line or in the ignition. If she runs for a few explosions when you prime her—it's gas trouble. If she won't run after she is primed, it's probably ignition.

Don't bother to look into the gasoline tank, 'cause you may be misled. I remember the time, when I was young and green and owned my first car. I parked her carefully in front of my best girl's house and waited in the front parlor for the young lady. She took half an hour or so to powder her nose and fix her veil and finally we marched out to my bus for a nice long ride. When we arrived at the auto, cute little baby brother was playing house in it. We chased him out and started off.

We had driven probably two miles when the engine began to splutter, and just as we rolled into a peaceful little valley, hot as tophet and dreary as a Sahara sand dune, the engine fainted. Even in those days I had a



"No Amount of Sympathy, Harshness, or Force, Will Accomplish the Impossible."

fine ear for music and so knew that the blamed thing wasn't getting the gas. I looked into the tank and found that the life fluid was within an inch of the top. So I just KNEW that the old engine was mistaken. I cranked my collar into a shapeless mass of linen, I cranked four big blisters into my hands, and I worked my arm muscles until they quit work entirely, but aside

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from an occasional splutter from the engine my work was futile.

With the going down of the sun, my girl hit the trail for home, leaving me to wrestle, unprotected, with the demon. I will say that I was glad in a way, I could vent my feelings somewhat, as I did, and get a chance to cool off.

After I had eased my soul of a few temporarily coined choice phrases, I began to work my think-tank. Eventually, I did just what I told you to do, a few paragraphs back; opened the pet-cock beneath the carburetor. The gasoline that came out of it wouldn't have been sufficient to have cleaned the kid gloves of a gnat.

Little baby brother was full of cute little tricks. He had poured about two quarts of sand into the tank and it took me about three hours to get it out and cost me about three gallons of gasoline. So, I warn you, don't bother to look into the tank, appearances are often deceptive. Generally you can tell whether there is fuel in the carburetor by removing the float valve cover, and noting whether there is any gas in the valve chamber or not.

To go back to our theme. Suppose you are in a refractory machine that is being prodded along by means of a magneto and find that "she won't go," just because the ignition system is minus the necessary incentive. Always look at the breaker points the very first thing, just as you did in the single coil system. Then examine the secondary connections. See that the oil and grease hasn't short-circuited any of the inside connections.

High tension current is just like an American doughboy when the war is over, it takes the shortest trail back home. See that all connections are tight and that none of the wires are broken or short-circuited. Electricity, of the low tension kind, that which runs in the primary circuit from the battery, will not jump across any gap, no matter how small.

It was my pleasure, for a time during last summer, to teach numerous classes in an automobile school. In one of the lessons, the students were supposed to find trouble. All of the instructors were in the habit of passing out a wire that had a break inside the covering; that is, the wire was broken, but the break did not show through the insulation. No student, who leaves that school will forget his perplexity over the seeming perverseness of an innocent piece of wire. On the road a wire often breaks inside the insulation. If the break occurs in a secondary wire, it matters little. But if it occurs in a primary circuit, its "ta, ta, boys, I've quit."

Now that we are on the subject of poor or broken primary connections, let me recall another peculiar reason "why she stops," or more correctly, "why don't she go?"

A short time ago, one of my friends (all of the subscribers to this magazine are my friends), requested a wiring diagram, which I gave him. Shortly thereafter, he called at the house, fortunately he lived near me, and propounded the question: "Why doesn't the dern thing run when the wires are all connected properly, all new wires, all good wires, everything just as it was when it came from the factory, except for a new switch?"

Long and thoughtfully, I gazed at that car, I talked to her gently and harshly, and finally she answered my question by telling me to scrape off the lacquer and paint from the new switch so that it would ground against the dash. I did—she did, and ran happily ever after.

A wire may be grounded to the switch, but if the switch is not connected to the dash, or the dash not grounded to the frame, or the frame grounded to the ignition unit, the electrical path is not complete.

Leading to a high tension magneto there is but one wire, besides those to the plugs, and this wire is used solely to ground the magneto current, in order to stop the engine. In one instance, to my knowledge, a driver was sorely puzzled because he couldn't stop his engine. He grounded the wire, but the engine kept right on and so, finally, he had to throw in high speed and stall the thing. When he overhauled the car, he had placed a piece of heavy paper between the magneto and the bracket upon which it rested. He had used old rusty washers upon the bolts, which also were badly corroded, consequently the magneto was fairly well insulated from the engine, so much so that he had trouble in starting, for the secondary current had to leap through the paper to the ground before the plugs would spark.

Before I end this article I want to mention the Ford ignition system. Now don't raise your eyebrows in superior disdain, even if you don't own a fliv, some of the readers may have one, hidden in a secret place—a skeleton in the closet, as it were.

Two husky roustabouts with plenty of nerve and muscle can test out the ignition system on a Ford, using the magneto as a source of current. One of them would remove all the spark plugs and spin the engine, while the other would attach a wire to the frame or base of the engine and use it as a test point.

Personally, I prefer a set of batteries in testing. Usually, I ground to the frame, one of the battery wires, then use the other as a test point. Aside from the fact that I use a battery, the tests made are the same. You can use either method you choose. Blisters and a wilted collar on the one hand and comfort and science on the other.

Before I describe the tests, let me outline the circuit. Let us first assume that the timer brush (the little roller inside the timer) is resting against the segment or terminal which is connected with number one coil.

When the switch is on current can pass from the magneto to the magneto post on the dash, into the coil box to the mag. contact of the switch, thence across the switch bar to the top and through a connection to the long bar at the bottom of the coil box. From this common terminal, the current will pass through the coil to one of the vibrator points, then to the other point and down to the little button terminal at the front of the

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coil. Against this little button rests a spring which is connected to one of the posts in the dashboard. Since this post, in number one coil, is connected with number one timer contact, the current passes through this contact to the ground and back to the magneto again, completing the circuit.

As the timer brush or roll passes to the next segment, the current ceases to pass through number one coil and passes through number two coil. So it goes, through each coil, according to the way in which they are connected with the timer.

Now we have connected one pole of our storage battery, or dry battery, as the case may be, with the frame and so, if we touch the test point to one of the timer wires (after removing it from the timer), the current should pass through that coil and cause it to buzz. We can work back through the circuit, and find any break in it by noticing whether or not we get a spark when we touch the test point to a wire or terminal.

Assume, for instance, that there were a broken wire in the coil itself. We would touch the test point to the timer wire which we had disconnected. We would get no spark. We would then touch it to the dash connection; then to the vibrator, still no spark. We would next remove the coil and touch the bar at the bottom of the coil box and would find that we could get quite a little fire from it. This would show that trouble exists in the coil itself and to verify the fact we would test the coil by itself. We would touch the two wires from the battery to the coil. One wire to the bottom of the coil, the other to the primary terminal at the front of the coil.

Now if we had chosen the blister and wilted collar method and had persuaded a friend to churn the hand crank like an ice cream freezer we would have proceeded as follows: We would have connected timer wire number one with the frame, disconnected the magneto wire at the dash, removed the cover of the switch and touched the switch bar. No buzz, no spark. Then we would have skipped to the vibrator side of the coil and would have found that our test wire showed life. We would have removed coil number two or three and touched the common bar at the bottom of the box and getting no result would have decided, as we already have, that the coil itself was to blame.

* * *

And so our story ends, right where in real life the story begins—with a Ford car. The most abused machine on the market, the butt of ridicule, the subject of all automobile jokes and sarcasm, but the one car that usually limps home, after a fashion, no matter whether it has been in a train wreck or forced to carry a pair of newly weds; no matter whether it has been climbing a mountain or crossing a desert of mud and sand. The one car that always answers all rude remarks with its cheerful "putt, putt."



EXPORTS OF AUTOMOBILES AND COMMERCIAL CARS FROM THE UNITED STATES.

Detailed figures supplied to the National Automobile Chamber of Commerce by the Bureau of Foreign and Domestic Commerce, show that for the year ending June 30, the total number of automobiles and motor trucks exported, not including cars and trucks shipped abroad for use of the American Expeditionary Forces, was less than in the fiscal years ending June 30, 1916 and 1917, but materially greater than in 1915 or any preceding year.

The record for the last six years is as follows:

	Commercial Cars		Passenger Cars	
Fiscal Year	No.	Value	No.	Value
1913	993	$1,737,141	24,293	$24,275,793
1914	784	1,181,611	28,306	25,392,963
1915	13,996	39,140,682	23,880	21,113,953
1916	21,269	56,805,548	56,234	40,660,263
1917	15,977	42,343,502	64,808	48,612,632
1918	12,200	31,874,459	52,312	45,331,366

Total valuation of passenger and commercial car exports during the last fiscal year, despite war conditions, was $77,205,825, compared with $90,956,134 in the twelve months ended June 30, 1917; $97,465,811 in 1916; $60,-254,635 in 1915, and $26,574,574 in 1914, the last pre-war year.

Aside from England and France, whose purchases were mainly for war purposes, the best markets for passenger cars and trucks were: Canada, $11,571,417; Cuba, $4,160,795; Chile, $3,859,149; Australia, $3,573,962; Argentina, $2,717,022, and Japan, $2,358,684; European Russia, $2,698,703; Mexico, $2,179,209; British South Africa, $1,813,221; New Zealand, $1,599,075; Philippine Islands, $1,588,310; Dutch East Indies, $1,465,549, and Spain, $1,444,736.

NEBRASKA LEADS THE COUNTRY.

Nebraska's name leads all the rest in the number of automobiles per capita, that opulent commonwealth having a car for every eight inhabitants. Moreover, the West is so far ahead of the East and South that the latter can hardly be expected to take any interest in the figures.

Even the District of Columbia, where there is popularly supposed to be such a congestion of cars as to have made it necessary for certain boards to move to Philadelphia, is eighth in the list.

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The leading Eastern State is Maine, which ranks twenty-first. Doubtless it is the ubiquitous tractor that accounts for this arrangement. But who would have thought that under any circumstances Montana would have more automobiles in proportion to population than Kansas, or Arizona than Ohio?

States lying side by side are far apart in this respect. Colorado has an automobile for every dozen persons within her borders, while in Utah every car must serve almost twice as many.

New York, with the pleasure cars of the largest city in the country and an up-State with farming communities, might be considered to have a good chance for a place high in the list, but it is thirty-third, being preceded by New Jersey and followed by Oklahoma. In absolute number of automobiles it is first, with 434,000.

Pennsylvania is the only other Eastern State with more than 300,000, and it is led by Ohio and Illinois, while California and Iowa also boast that number.

The figures, compiled by the Bureau of Publicity of the Omaha Chamber of Commerce, would be still more interesting if they were analyzed to show the relative number of pleasure vehicles and tractors in the several States.—Evening Post.

The Neglected Opportunity

The Owner Of An Accessory Store Is a Back Number If He Is Not Willing To Put Up a Good Window Display.

BY FRANKLIN MYERS

CONFIDENCE born of positive knowledge of conditions makes the "Johnny-on-the-spot" kind of a man. We're getting back to business by leaps and bounds—so stiffen the fibers of your business sense—clarify your gray matter. Overhaul that faded and haphazard window exhibit—be "Johnny-on-the-spot" like our boys over there—work the way they fought.

The best window display is the one that is most striking and done at the least cost. I have seen displays that cost anywhere from twenty-five to fifty dollars that were an absolute disappointment so far as money return is concerned. Spending a lot of money on the display is the very first thing the retailer must get out of his head. The real, good, successful, money-winning display is the one that the retailer and his clerks can make themselves. It is a business proposition pure and simple, and should not cost more than just a few dollars, so that a very good profit over and above all expenditure is assured.

To awake in the observer a desire for possession, is the mission of the window trim. If it does not do that, it is a failure, be it ever so attractive in arrangement and color scheme.

There are many displays pleasing to the eyes but which, when analyzed, are found wanting in the quality of selling force. That is the point around which skill in producing impressive display should be applied. A frank, simple and practical trim is more convincing than the freakish variety. Every detail of every display should be worked out with deliberation, and care taken at all times to have the window reflect the true character of the establishment.

The plain marking of every article is imperative at any time, but more especially so when many extra salespeople are employed. The price ticket is a powerful aid in retailing goods. Many sales are lost because the price is not marked on articles, and it is wonderful how neglectful in this respect even large stores are liable to become. When the price is plainly marked many customers will wait upon themselves up to the point where the checking of articles comes in.

There are stores and stores. There are "grouchy" stores and "smiling" stores. There are flippant stores and dignified stores. And the peculiar thing about each is that the goods or the prices have little to do with the store's temperament.

It is the personality of the store that colors and defines the character of the goods from the customer's viewpoint and wins or repels approval. Thus we see that a store is almost human.

In the long run, service is what you pay, always. The goods as goods alone, are incidental. Service implies quality, fair prices, safe treatment and honesty in every detail of every transaction.

It is the duty of the sales clerk—a most important duty—to inform the manager immediately when certain portions of the stock are running low. Nowadays it's almost criminal for a store to actually run out a product through any cause—that is, providing no very great special rush has been made on that one particular article—even then there's hardly any excuse unless the manufacturer happens to be stuck for material.

Here's another pointer for the clerk—the words "Haven't got it" ought to be shunned—they ought to be forgotten—never to be resurrected—they are not part of a salesperson's vocabulary.

Imagine yourself an accessory store owner; seeing a customer approach a clerk—and then have the clerk spill out "Haven't got it."

In the name of common sense, show the merchandise you have—tell a bit about it—explain the merits of the goods to the customer, with the remark that it is the nearest we have to what is called for.

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The idea, of course, is to sell merchandise; but whether it is sold or not, leave a good impression, make the customer feel as though you are interested, have him understand that you're glad to show merchandise. Preference is given the salespeople who are accommodating.

The merchandise you're selling is GOOD merchandisc—well worth it's price. Show it, explain it. And forget "I haven't got it."

Be Johnny-on-the-Spot!

Any advantage to be gained by superior methods is indispensable to complete success. Your store windows must be counted as just so much advertising space—to be filled with live matter the same as advertising space in a newspaper and just as valuable. Captions and headlines are used in the show window in the same manner and for the same purpose as used in the newspaper—to call attention to what you have to sell.

This statement is so simple it almost seems childish—yet, within a stone's throw from where I sit writing there are at least ten good sized stores on the main thoroughfare that resemble neglected gardens—choked with weeds and stubble. The big auto accessory store on the corner has not had a change of window display in five weeks—many of the plain uninteresting show cards are curled up and dust has settled on the miserable exhibit.

I know the man—he's lazy and his help are doing all in their power to be just like the boss. You very seldom notice anyone looking in the windows of that store. That man is losing hundreds of dollars every week, but he doesn't know it. He is in possession of the best location on the block or in the neighborhood and is keeping some good live man out of a fortune.

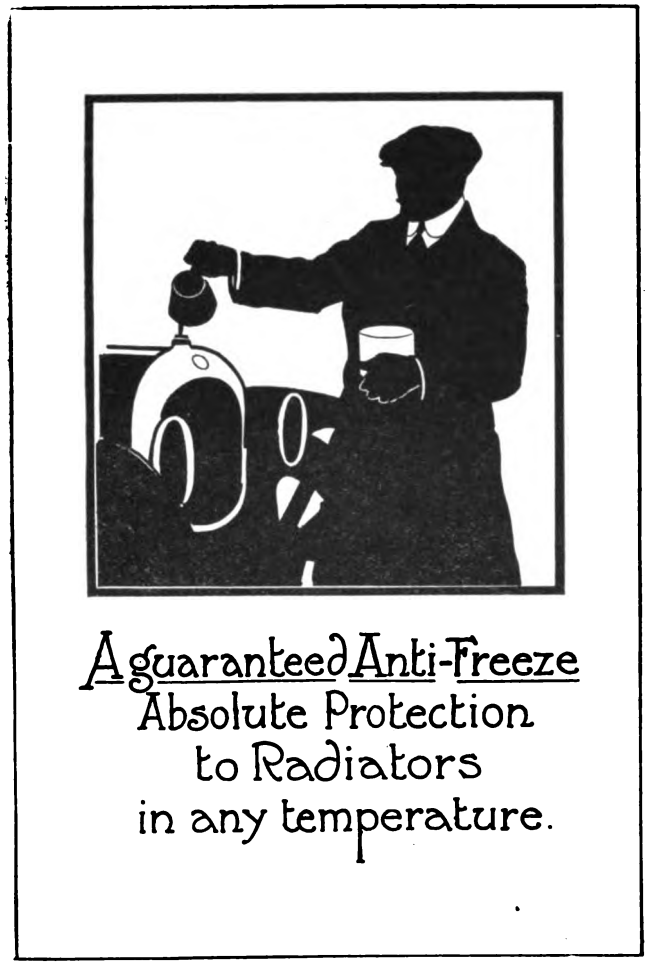
He is a "puddenhead"—call him anything you like, he'll think he is "some pumpkins" just the same. He secured the store some years ago and the neighborhood grew up around him. To my knowledge he has never done a single thing to encourage trade. Years ago the man who sold the store to this "Mr. Pumpkins" was even slower than Mr. P.



A Poster Window Background to Be Done in Purple and White. See Your Sign Man About It—Show Him This Illustration.

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The landlord was brighter than either—he wanted to get more rent out of the place so he put in new and larger show windows. "Mr. Pumpkins" made a howl because the landlord had designs on the contents of his wallet—which I guess if the truth was known, wasn't very heavily plastered with long green. Business of course just naturally picked up and "old Pumpkins" began to swell up in the region of the chest and occasionally shot forth advice on how to improve your business.



Did you ever notice that it is just this kind of men that have money thrown at their heads—at times? No! It wasn't luck at all—it was good business ability on the part of the landlord—if "Mr. Pumpkins" had been given his say—he would be in the old original dingy store yet.

A great many people often argue that there is a lot of luck in business! Maybe there is, but it doesn't come to the man who sits in his private office and waits for it to visit his store. If there is really luck in getting trade, it has to be dug out and captured and held fast.

In this case it was the landlord who did the digging.

Many a man just misses being a success through his persistence in pursuing business policies or personal characteristics which keep him in the ranks of the unsuccessful. He believes that he is doing all in his power to progress, but something is wrong, some cog is misplaced, or has sand where oil ought to be, and the man is ignorant of the basic wrong.

A searching self-analysis is in order. The outside viewpoint must be gained. Possibly a rank outsider who is capable of intelligent criticism can locate the wrong. Again, the man himself may be able to assume an entirely disinterested attitude and so give himself or his business a thorough "up and down" that will allow for readjustment along successful lines.

So far as "Old Pumpkins" is concerned—he couldn't take more of a disinterested attitude if he tried—but he can't see anything—either coming or going. "There's nobody home" in the top story. What are you going to do with a store keeper like that? He's got the location and manages to hold on to it—somehow or other—no one knows—sometimes I think he must have married in the landlord's family—it has been just his "luck" to get a smart helpmate.

But listen and I'll tell you the rest of the story. Just one block away another big store has started up—"Old Pumpkins" is beginning to take on a worried look. The New Store is right up to *now*—it is a bright, clean, sociable store. The show windows reflect the enthusiasm and energetic efforts of some professional who knows his business.

I go into the store often to see how progress works out. The windows contain Pictorial Display Cards—plenty of them—and they are pulling like the big home-made porous plaster mother used to make.

The store is crowded all the time—the cash registers are singing all day long that delightful ballad entitled, "O, see the 'cash' flow in."

Anyhow "Old Pumpkins" has at last met his Waterloo—he is getting it where the chicken got what little George Washington sampled his father's cherry tree with—so to speak. He says he's going to move to Hoboken—see? He's a quitter—he always was a quitter but it didn't show up until he had a good excuse.

The Silhouette Display Card.

It is strange that more silhouette cutouts are not used on signs—surely there must be a screw loose somewhere—and it was just through this kind of thinking that the writer set out to find that screw and tighten it up.

It goes without saying that when a thing can be done in a simple way, that is, when some really good, meritorious sign scheme can be worked out easily so that a very satisfactory result is quickly obtained, its popularity is easily assured. The writer has observed sign men either drawing or tracing pictures on black paper and then with much difficulty endeavor to cut out the pictures. It's rather a long-winded operation and has been avoided particularly by the store clerk because of the bothersome preparatory detail and the cutting which, so to speak, is done in the dark, as the paper being black does not show the outlines of the picture clearly enough for rapid cutting.

The consequence is, the clerk, after one such experience, generally finds some excuse for not following up what is really one of the most striking and attractive

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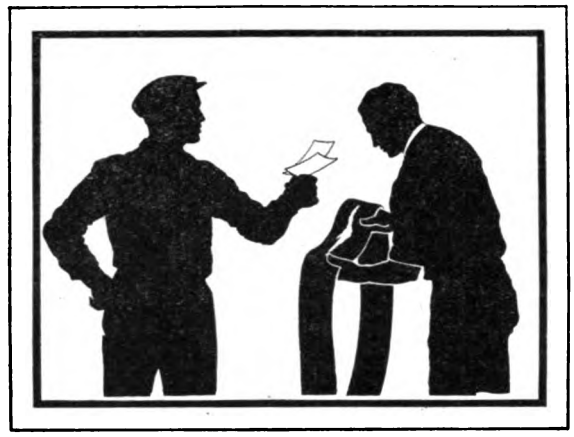
styles known to the professional sign writer. Of course, the layman or the clerk cannot be blamed for dropping, like a hot potato, anything in the way of a sign that is going to eat up too much of his already well-filled time, but instead of dropping a thing on first trial right away, why not in spare moments think up some easy way of getting the desired result?

Here is an easy way of obtaining the silhouette without as much as touching a pencil. Go through your old magazines and select such pictures as give a side view—the kind of pictures that display well when cut out.

Different positions of figures will often suggest to you certain words or catch phrases for lettering use on the sign. Cut out all these pictures that you think suitable for this purpose, using a small pair of scissors, except on inside cutting, which is better accomplished with the penknife.

Get a tube of ivory black or lamp black water color, and mix it well in a small dish with an ordinary No. 5 sable brush, paint over the cutouts in jet black; when dry, paste them down on the card, leaving enough space for the lettering. This explanation tightens up the loose screw and shows the reader just how very simple this silhouette process is when it has been properly thought out.

Your pictures are already drawn for you, there is no bother cutting into black paper because there is no black to contend with while cutting is under way, all the black being put on afterward. Simple, isn't it? Still, there are men day in and day out throwing aside this particular sign that has the punch, just because there seemed to be no easy way of doing it.



Put on a good Patch while you're about it—one that WILL stay put—
We Sell 'em



SKID-DOO!
No! Don't Skid—come in—get your Chains here!

SOMETHING NEW IN TOPS.

The West sometimes brings out something good that the East is very glad to adopt after becoming conversant with it.

On the Pacific Coast recently, they have hit upon a brand new and attractive idea in the recovering of cars having solid tops of the Victoria or semi-Victoria types.

The material used for the recovering is one of the Fabrikoid lines. It is claimed for it that it gives the car a striking elegance and individuality not possible with any other material yet tried; that it will last indefinitely on a solid top and always retain its beauty. Thousands of the finest cars on the coast are now to be seen on the streets resplendent in these new tops, the material for which comes in all solid colors and in many beautiful two color combinations exactly duplicating in grain and finish the most luxurious Moorish and Spanish leathers.

The coating on the Fabrikoid is pyroxylin, a material which does not oxidize and break down under severe atmospheric conditions as does rubber or any coating prepared with linseed oil. Because of the pyroxylin coating, a protective film is formed which will not discolor, fade, turn gray or hold dust. It is absolutely waterproof and can be washed like glass or china with plain soap and water.

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EASTERN CANADA'S SHOW.

The National Motor Show for Eastern Canada for 1919 will be held in the Victoria Rink, Stanley and Drummond Streets, Montreal, from Saturday, April 5th to 12th, inclusive, and the exhibits will include Passenger and Commercial Cars, Motorcycles, Motor Boats, Aeroplanes, Accessories, Tractors and Farm Lighting outfits.

The decorations will be in the form of a huge Japanese garden which will have a very pleasing effect, as in addition to a large quantity of Southern smilax, natural shrubbery and foliage will be used with flags of all nations. The lighting arrangements will include five thousand eight candle-power lamps, carbon, tungsten and nitrogen lamps.

The show will be run in aid of the Montreal Soldiers Wives' League, and a very elaborate and well organized ticket selling campaign is being arranged by the various ladies' committees. These tickets will be placed on sale throughout the city, and it is expected that a tremendous number will be sold.

A special section of the show will be placed at the disposal of exhibitors showing motor boats, and application has already been received to exhibit a 27-foot motor boat. Mr. T. C. Kirby is now busily engaged in allotting space and attending to the thousands of details in connection with a huge exhibition of this kind.

REMOVING CARBON.

The use of kerosene is often advocated as a means of removing carbon. This liquid must be used in conjunction with a certain amount of water, or the remedy will be worse than the disease. After the engine has been started and fully heated, pour about a teaspoonful of kerosene into the carburetor air intake, then pour in a like amount of water. Alternate the kerosene and water until about a half a teacupful of each has been used.

Steering Gear and Linkages

The Car Owner Should Make Regular Examinations of the Steering Gear—His Safety Depends Upon It

BY F. L. ALMY

NO part of the car receives so little attention as the steering gear, yet it is really the most important device on the car. The steering assembly in the modern car consists of a number of parts which are illustrated in Figure 1.

At A is shown the steering wheel; B the steering column; C the steering gear, which embraces all the steering reduction gearing, or similar devices; D shows the drag link which connects the Pitman arm, H, with the projection on the steering knuckle, G.

Passing through the steering knuckle, G, is a pin termed the "king pin," or sometimes the "king bolt." There is a similar bolt at the opposite end of the axle for the left steering knuckle. Both steering knuckles are connected by a tie-rod, E. This arrangement permits the wheels to turn upon the wheel spindles without swinging the whole front axle, F, as in a wagon.

At the present time we are concerned particularly with the unit C, termed the steering gear, which transforms the circular motion of the steering wheel, A, into lateral or back and forth motion of the Pitman arm, H. In the older types of machines a long lever, extending up to the driver's seat, connected with the tie-rod and permitted the driver to move the wheels in the various directions. However, should one of the wheels strike an obstruction in the road, there was danger that the steering arm would be jerked out of the hands of the driver and the car run wild.

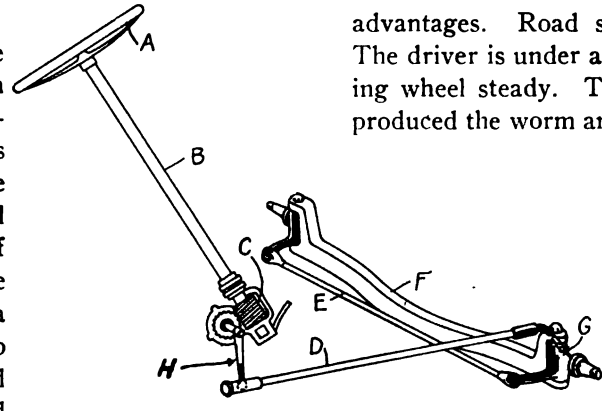


Fig. 1—Showing Parts of the Steering System.

To prevent this, the steering gear C was devised. It is nothing more or less than a means of power reduction. The older type is called the gear and quadrant and is shown in Figure 2. A indicates the steering column upon which is mounted a bevel pinion steering gear, B, which meshes with a quadrant or quarter gear C. As A is turned, through the steering wheel, the quadrant is rocked back and forth, and since the Pitman arm, D, is connected directly with the quadrant forging, the drag-link is moved back and forward as required, steering the car.

One can see that this type of steering gear has its disadvantages. Road shocks are not entirely eliminated. The driver is under a strain at all times to keep the steering wheel steady. To eliminate this backlash, designers produced the worm and sector type of steering mechanism shown in Figure 3 at B.

In this diagram C indicates the steering column upon which is mounted the worm E. The worm meshes with the sector, that is, a section of a worm wheel, as shown at F, and this sector carries upon it the Pitman arm G.

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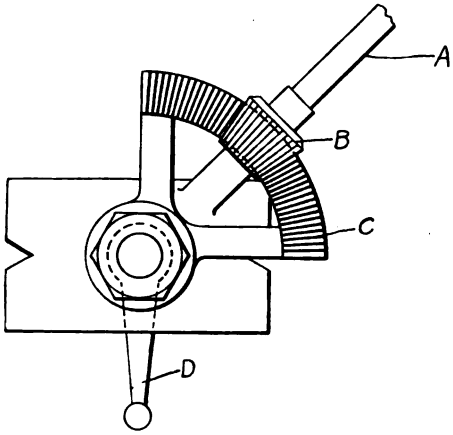


Fig. 2—Gear and Quadrant Type of Steering Gear.

In this case it is easy enough to turn the steering wheel; the steering wheel turns the worm through the shaft and the sector F is moved back and forth. On both sides of the worm, and illustrated at D, are usually mounted a pair of ball thrust bearings, though in some cases simply a bronze washer is used. Continued use of this type of steering gear naturally would result in a certain amount of wear. The wear comes usually upon the sector F, and as there is no way to prevent this, after a time it will become necessary to replace F.

To obviate this, and to increase the life of the device, engineers evolved the worm and wheel type of steering gear shown at A in the same sketch. In action this device is the same as the one shown at B, except that the full wheel F replaces the quarter wheel or quadrant in the first type. When one-quarter of the gear F becomes worn, the Pitman arm G can be removed, the gear given one-quarter of a turn and the Pitman arm G replaced. This is practically a replacement of the worn portion with a new section, and is one means of adjustment of this gear.

End play in the steering column C can be taken up by screwing down the large nut at the top of the gear assembly. This nut presses against the bearing D and compensates for any lost motion or wear in the bearings. In some types of steering gears this nut may be found at the bottom of the gear. In the higher priced cars a more complicated steering gear is adopted. This gear is termed the "sliding block" type, and consists of the parts

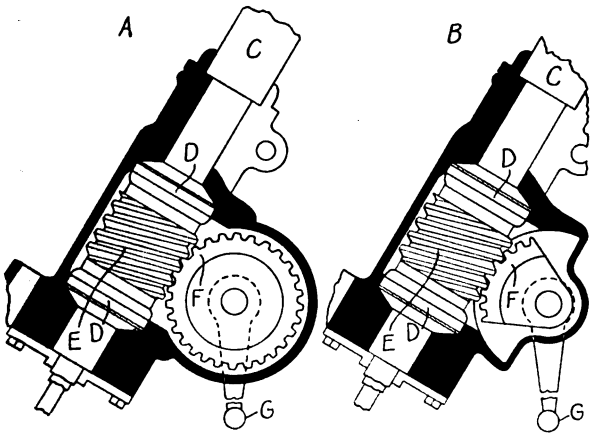


Fig. 3—Worm and Wheel, and Worm and Sector Types of Steering Gears.

shown in Figure 4. An assemble sketch is also reproduced in the same figure.

Upon the steering column B is mounted the double worm A. By a double worm we mean a worm that is cut with both a left and a right-hand thread. Two blocks, C and D, are fitted with teeth, one block has left-hand teeth fitted upon it, the other has right-hand teeth. As the steering column B is turned towards the right, the block D will travel upward on the worm, while the block C will travel downward. Each of these blocks rests against a roller, F, upon the peculiar shaped piece J. At one end of J is mounted the shaft G, and upon it the Pitman arm K.

As the blocks travel upward and downward, J is twisted to the left or to the right and the Pitman arm moved forward or backward, steering the gear. The general method of adjusting this device is similar to that adopted in adjusting the steering gears shown in Figure 3.

The steering gear on the Ford car is of an entirely dif-

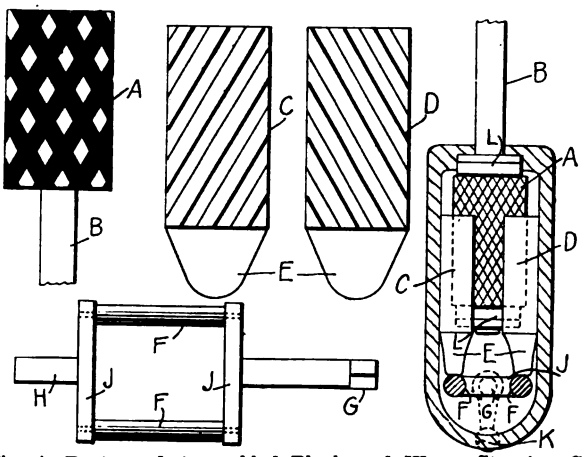


Fig. 4—Parts and Assembled Block and Worm Steering Gear.

ferent type from any of those described. Instead of being located at the lower end of the steering column, it is located directly beneath the steering wheel. The lower end of the steering column is fitted with the Pitman arm and the gear reduction is had by the device illustrated in Figure 5. The housing for the steering column is fastened to the dashboard. This housing, C, is fitted inside with an internal gear. To the upper end of the steering column is fastened the forging E, upon which are mounted three studs, and upon these three studs are mounted, free to move, three small gears, two of which are shown at G and at D. The center gear J is fastened directly to the steering wheel. As this gear is turned, then the small gears, G and D, are revolved. They form small levers which twist the forging E around and so turn the steering column.

Steering Linkage.

Next in importance to the steering gear come the fittings at the steering knuckle. It is very important that this portion of the car be kept in good condition, for should the king-pin break, an accident surely results. Since all of the pressure and shocks of the road go through this pin, the wear at this point is excessive. Every car that comes into your shop should be examined at this point. The front of the car should be jacked

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from its wheels, and if there is any play in the steering knuckle, new parts should be put into place. Usually the steering knuckle forging is bushed with a bronze sleeve, though in a few expensive cars ball bearings are provided at this point.

We have made comparisons with the bicycle of olden days; let us go back a minute and learn another lesson from it. If you ever tried to reverse the front wheel—that is, turn the forks in the other direction—you know how hard it was to steer the bicycle. As a matter of fact, it was almost impossible to steer the wheel at all if the forks were wrong side foremost.

The same thing is true about the front axle of an automobile. The king-pin slants backward at the top slightly. Very frequently an automobile will be brought into your shop for repairs. The owner will claim that

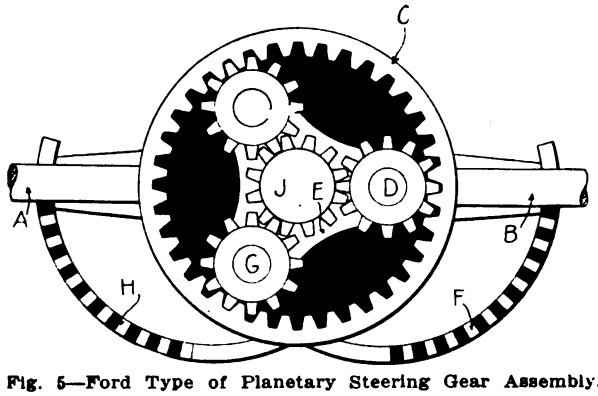


Fig. 5—Ford Type of Planetary Steering Gear Assembly.

he has great difficulty in steering it. Always examine the front axle and see that the steering knuckle and king-pin slant backward slightly. The axle may be bent or it may be that the springs have slipped just enough to tip the axle slightly. At any rate, once you know about the trouble, it is easy enough to repair it.

EXCESSIVE LUBRICATION IN V TYPE ENGINES

As a means for preventing excessive lubrication and oil leakage into the explosion chambers of the right hand block of V type engines, a baffle plate has been suggested.

If the oil dippers on the ends of the connecting rods are cut down, there is danger of cutting off the lubrication from the left side of the engine.

Directly beneath the path of the piston, at its lowest point, screw or bolt a large tin, washer-shaped plate, slotted to give clearance for the connecting rod. This plate will eliminate much of the direct splash from the connecting rod dippers, but will not prevent the entrance of oil vapor into the cylinder chamber.

At the lowest point of this plate, two or three small holes should be drilled. These holes will act as drains for the surplus oil, condensed in the cylinders and pistons.

When the plates are in place, the cylinder, inside, will resemble a closed tin can, with a slot at the bottom (in the plate) for the connecting rod.

RAISE IN SUBSCRIPTION RATES.

CONSTANTLY advancing costs have forced us to consider seriously an increase in the subscription price of the Automobile Dealer and Repairer.

Of course it is well known to most readers that white paper, printing, binding, postage, in fact everything connected with the publication of a journal like ours has gone up in some cases more than one hundred per cent. It costs us now very nearly if not quite twice as much to produce our magazine as it did before the war.

In view of these circumstances we believe our readers will feel that we are fully justified in raising our rate to $1.50 a year, to take effect April 15th next. This new rate will apply to all of the United States except zones seven and eight, comprising the following States: Arizona, California, Colorado, Idaho, Kansas, Montana, Nebraska, Nevada, New Mexico, North Dakota, South Dakota, Oklahoma, Oregon, Utah, Washington, Wyoming. In these two zones (seven and eight) we are compelled to make the rate $2.00 a year owing to the exorbitant postage called for by the new law.

In view of the great amount of valuable information which the Automobile Dealer and Repairer furnishes each year, the increase in cost to each subscriber of 50 cents will, we feel sure, not be considered a hardship and the increase in our income will enable us to improve our journal from time to time and make it well worth the additional 50 cents which we are compelled to charge.

We have been encouraged in the matter of raising rates by numerous letters received from subscribers to the effect that if we were forced to raise, they would cheerfully pay the advanced rate. A letter recently received from Dr. R. T. Greer, of Mississippi, is especially reassuring. He says, "Enclosed you will find check for renewal of my subscription to the Automobile Dealer and Repairer. When you raise the price to $1.50, I shall still stay with you. When you get to $5.00 per year my name will continue on your mailing list. I would not be without your journal under any circumstances. Raise your price as the journal is worth the money. I am willing to bet that you will not lose a single subscriber."

By postponing the date of the raise to April 15th, we give our old subscribers (as we think is only fair), a chance to renew their subscription at the old rate. Those who have recently renewed can have their subscriptions extended for a year longer by sending a dollar for that purpose.

Each present subscriber will be permitted to recommend two friends of his (whom he thinks may be benefited by reading the Automobile Dealer and Repairer) as subscribers and we will give them the advantage of the old rate of a dollar a year. In sending these subscriptions with remittance each subscriber who takes advantage of this offer is requested to call attention to this offer.

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Reading a Micrometer Caliper

The Mechanic of the Present Day Must Be Able to Measure Within a Ten Thousandth Part of an Inch

BY R. W. SMITH

IN the old days a workman who could work within a limit of error of one-sixty-fourth of an inch was considered, no doubt, as extremely capable. And so doubtless he was. For this is pretty nearly all he could be expected to do with the means of measurement at hand. So long as all that was required was to fit one part to another, also on the spot, good work could be done.

But with multiplication of machinery over the breadth of a great continent, the need for the prompt and accurate replacement of a worn-out part became imperative. This

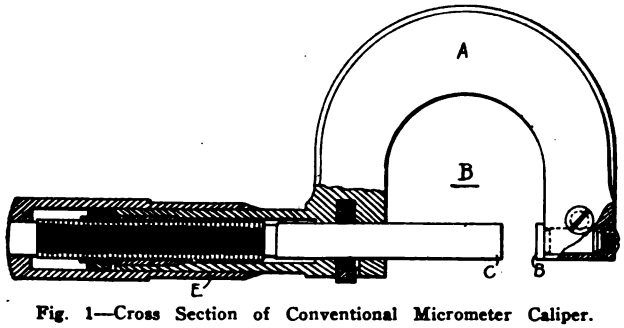


Fig. 1—Cross Section of Conventional Micrometer Caliper.

could not be done unless the original machine had had its parts machined very closely to standard. Further, in the procees of assembling at the manufactory, if many duplicate machines were being built, it became an intolerable nuisance to get a set of parts that would not fit together.

So, for their own immediate benefit and also for the benefit of their customers, those who manufactured large quantities of duplicate machines were driven to make up the many parts within an exceedingly small error. The limit of 1/64 inch became out of the question. The micrometric measuring tools are the answer to this demand, and it is now quite practicable to measure within the limit of .0001 of an inch.

The Pitch of the Micrometer.

The essential idea which underlies the micrometer screw is the fact that the advance which a screw makes in a nut in a single revolution is precisely the length of the pitch, and that it is possible to measure small fractions of this advance in corresponding fractions of a complete revolution. To fix our ideas, suppose the screw and its nut have exactly 100 threads to the inch.

If the nut is held stationary and the screw turned exactly one revolution, then the screw will have advanced precisely the longitudinal distance between the adjacent threads—bottom to bottom of thread, or top to top. This distance is exactly .01 of an inch. Now if we make a half-turn, the advance is one-half the pitch, or .005 inch. Or, suppose we are able to determine when we have turned the screw .1 of a turn (36°). The advance then would be just .001 inch (.1 × .01 = .001).

Now in the ordinary micrometer calipers the screw is usually cut with 40 threads to the inch. Each turn consequently advances it in its nut 1/40 inch. To measure .001 inch we must determine when we make 1/25 turn, for the reason that 1/25 × 1/40 = 1/1000.

Consider now the partial sectional view of a typical micrometer caliper, the section passing through the axis of the screw, as shown in Fig. 1. The frame or body of the caliper is shown at A. A hardened steel piece, B, is set in on one side and forms what is termed the anvil. Engaging with the thread of a nut arranged in the opposite side of the frame is the micrometer screw. This screw is part of the spindle, C. The nut is essentially a part of the frame, A. The part which incloses the screw is the barrel. There is a metal shell, E, termed the thimble, which envelops the barrel. It operates, however, in unison with the spindle. If it is turned, the spindle is turned.

The caliper consists, essentially, of two parts—one fixed, the other movable. The barrel, frame and anvil constitute the fixed portion. The spindle and the thimble make up the movable part. The movable part has two movements relative to the fixed portion—a linear and a rotary motion. A moment's consideration will show that we can arrange a scale on the barrel which will enable us to tell, roughly, just how much the thimble advances or recedes. This we do by noting the position

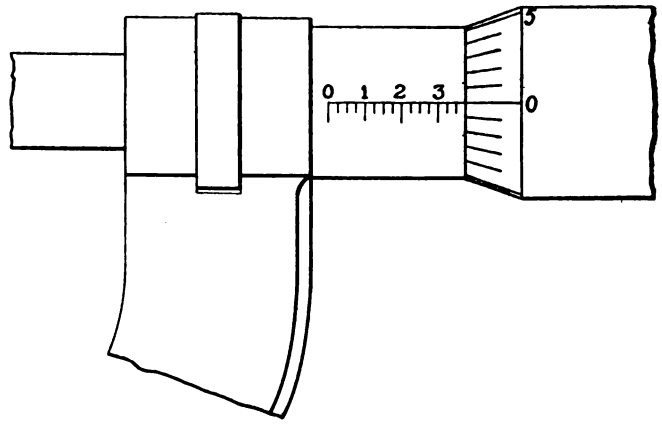


Fig. 2—Caliper Opened Just .375 of an Inch.

of the inner end of the thimble. This is beveled off to a thin edge and so permits this to be done with ease.

Meaning of the Divisions.

Each little subdivision of the scale is 1/40 of an inch, and consequently corresponds to one complete turn of

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the screw. Four such subdivisions amount to 1/10 of an inch and constitute a principal division of the scale. If the scale is one inch long, there are thus 10 such principal divisions. It will now be seen that every turn of the spindle means that it has advanced on the anvil or receded from it exactly 1/40 of an inch—or one subdivision. Each subdivision then corresponds to an opening or closing of .025". One principal then corresponds to .100".

Let us consider a practical example. Suppose we wish to measure ⅜ inch. Expressed as a decimal this is .375 of an inch. We open the caliper, say from a position where it is entirely closed until the edge of the thimble has cleared three principal divisions. This amounts to .300". As each subdivision is .025", we continue to open out until three of them are cleared in addition. This last movement amounts to 3 × .025" = .075". The total movement is, consequently, .300" + .075" = .375". And this is the desired opening. See Fig. 3.

It is well to grasp this thoroughly, so let us take another example. Suppose we wish to open a gap between anvil and spindle of ⅝ inch. In decimals this equals .625". We observe at once that we may write .625"

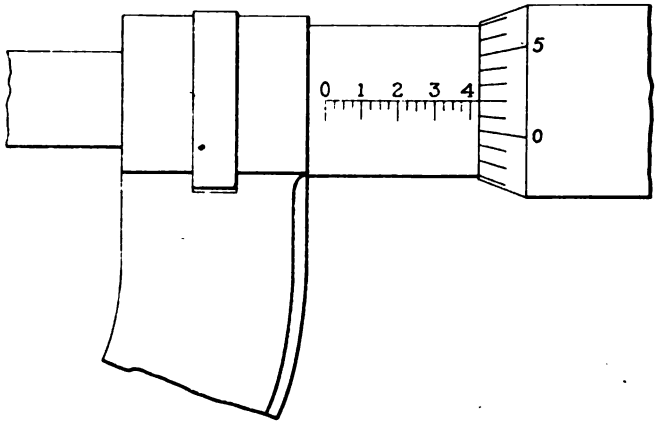


Fig. 4—Caliper Opened .427 of an Inch.

as .600" + .025". All we have to do, then, is to open out until six of the principal divisions have been cleared and, in addition, one subdivision.

But if this were all that the micrometer caliper could do, the finely chased screw would be of but little advantage. We have been depending, so far, upon the eye to determine when we have just cleared a principal division or a smaller one. A highly trained eye might, perhaps, accomplish this with considerable exactitude.

There is, however, a much better way. Suppose we make a longitudinal mark on the barrel. Let us now close up the caliper and make a mark on the bevel of the thimble to correspond with it. If now we open the caliper until the mark on the bevel again corresponds with the longitudinal mark on the barrel, we know that we have made one complete revolution. This revolution means, let us remember, a longitudinal movement of 1/40 inch, or one subdivision.

Now we can, of course, divide up the entire circuit of the bevel into any convenient number of parts—say 25. A turn of the spindle of 1/25 of a revolution would thus cause a longitudinal movement of 1/25 of 1/40 of an inch. That is, one of the little divisions on the bevel corresponds to .001 inch. We are now making use of the rotary movement between the two sections of our caliper. In fact, the 25 subdivisions on the bevel enable us to do what is equivalent to dividing up each 1/40 inch on the barrel into 25 equal parts.

Let us gather up our results somewhat. Each principal division on the *barrel* amounts to .100". Each subdivision on the *barrel* amounts to .025". And each subdivision on the *thimble* amounts to .001". Now, of course, we should have figures placed on our two scales—one of which is on the barrel, and the other on the thimble—to save ourselves the trouble of counting The scale on the barrel is given a number for each of the principal divisions.

The scale on the thimble is numbered at every fifth subdivision. See Fig. 3. Now one important thing to remember is that these two scales are really not two but one. The *whole* scale on the thimble is merely *one* of the barrel subdivisions cut up into 25 equal parts.

An Example.

Suppose now we take an example. See Fig. 4. The position of the edge of the bevel shows that the thimble has been moved out four principal divisions of the barrel scale, one subdivision, and something over. The gap in the caliper amounts, then, to .400" + .025" and something more. When the zero on the thimble just corresponded to the longitudinal line on the barrel, there was no excess over .425". But the thimble has been rotated two thimble subdivisions further. That is, the excess over .425" is .002". So that the opening between anvil and spindle is .427". Let us now consider an example of a converse character. Suppose we wish to open the caliper so as to have a gap of .368". We break this up thus:

.368" = .300" + .050" + .018".

We open the caliper, then, so as to clear three principal divisions on the *barrel* (.300"), and continue until two subdivisions are cleared (.050"), and then continue further until we have turned the *thimble* to the position where its 18th space is just below the longitudinal line on the barrel. The proper position is shown in Fig. 5.

The Vernier Scale.

However, it frequently happens when measuring that the thimble comes to rest with the long line on the barrel *between* two consecutive marks on the thimble bevel. Such a position is shown in Fig. 6. We see that the gap must be .200" + .025" plus something more. We may *guess* that this "something more" is one-half of .001" (*i. e.*, .0005"). But if we want to determine the point with a higher degree of accuracy, we may do so by means of a *vernier* scale arranged on the barrel. There is other fine measuring mechanism which employs this

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device, so that it may be worth learning aside from its use on micrometer calipers.

Suppose we have a scale whose subdivisions are easily enough read, but which we want to read to *tenths* of a subdivision. We make another scale having *ten* spaces corresponding to *nine* of the original scale. See Fig. 7.

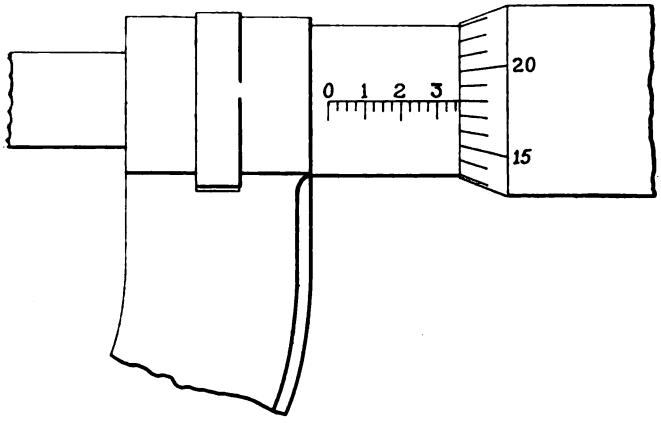


Fig. 5—Caliper Opened .368 of an Inch.

Here we have the two zeros together. If we look at the next pair of marks, the one on the vernier will, of course, be found behind the one on the other. In fact, since one vernier space is 1/10 of 9 original spaces, we see that a vernier space is equal to 9/10 of an original space. The vernier mark is, consequently, just 1/10 of an original subdivision behind. At the next pair of marks the vernier is 2/10 behind. And so on. Thus, line "6" on the vernier is 6/10 behind. Now let us see how advantage may be taken of this device on a micrometer caliper.

Refer to Fig 6. We find that the reading is somewhere between .225" and .226". Now a vernier scale is arranged circumferentially on the barrel beginning an *integral* number of *thimble spaces* above the long line on the barrel. The vernier has 10 spaces corresponding to 9 on the thimble. Now, since the vernier begins an integral number of thimble spaces above the long line on the barrel, we know at once that the zero on the vernier occupies precisely the same relative position between marks 3 and 4 on the thimble as the long line does between marks 0 and 1. What we want to know, then, is how far above the thimble mark "3" is vernier mark "0."

Now we know that as we follow the vernier round its marks will be falling back towards the thimble marks at the rate of 1/10 a thimble space each time. Consequently, when we find that mark 7 on the vernier is even with a mark on the thimble, we know that in 7 steps the vernier has lost the total amount it was ahead. This means, then, that the vernier zero is 7/10 of a thimble space ahead of thimble mark 3. Or, what is the same thing, the long line on the barrel is just 7/10 of a thimble space ahead of thimble mark 0. Now 7/10 of a thimble space corresponds to a *longitudinal spindle movement* of 7/10 of .001". This is .0007".

Reading the Vernier Scale.

In other words, we get the rule: *Find the line of the vernier which matches any line on the thimble; the number of this vernier line gives the figure for the ten-thousandth's place in the micrometer reading.* In applying this rule, we must take the smaller of the two alternative readings obtained without the vernier as the one to which we add. Thus, the readings obtained from Fig. 6 without the vernier are .225" and .226" (the true figure is between them). We have now found that we add .0007" to the small, and so we obtain, finally, .2257".

It should now be apparent that with the aid of this simple arrangement it is quite possible to read to four places of decimals with a micrometer caliper of ordinary construction. It adds about $1.00 to the price of the instrument.

Several difficulties have beset the practical use of the micrometric caliper. One of these connects itself with the changes in dimensions due to temperature variations. The difference of a single Fahrenheit degree produces a change in the linear dimensions of a bar of steel of .000006. Thus, if a piece of steel is 4 inches long, one degree will produce a change of .000024". Fifty degrees brings a change of .0012".

It is quite conceivable, then, that if the difference in temperature between work and caliper be considerable we may have errors in our readings. However, the expansion or contraction of both spindle and frame seem to compensate each other, partially at least. However, the frame of the caliper may become warm from the hand and so expand alone. To meet this difficulty, the United States Government had micrometer calipers made by one of the principal makers in which the steel skeleton

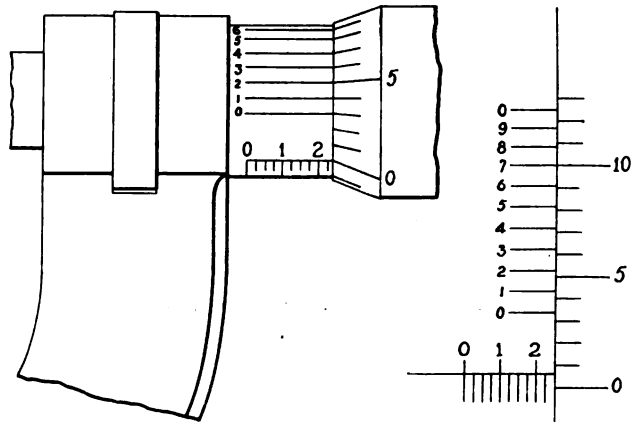


Fig. 6, At Right—Caliper Opened .2257 of an Inch. Fig. 7, At Left—Illustrates Location of Vernier Markings.

frame is covered with hard rubber, thus effecting heat insulation.

Further, the work itself may expand or contract under the influence of thermal changes. If absolute accuracy is required, work and measuring instrument should both be at the same temperature.

Another difficulty connects itself with variations in

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pressure when final contact with the work is made. A little more or a little less pressure will give various readings. One workman may get a slightly different measurement from another. In fact, the *same* workman may get two or more readings owing to variations in pressure. With the powerful 40-thread screw there is no trouble to strain the parts slightly or perhaps to compress the work. This difficulty has been very well solved by the use of a ratchet stop.

When the final turn is about to be made, the workman

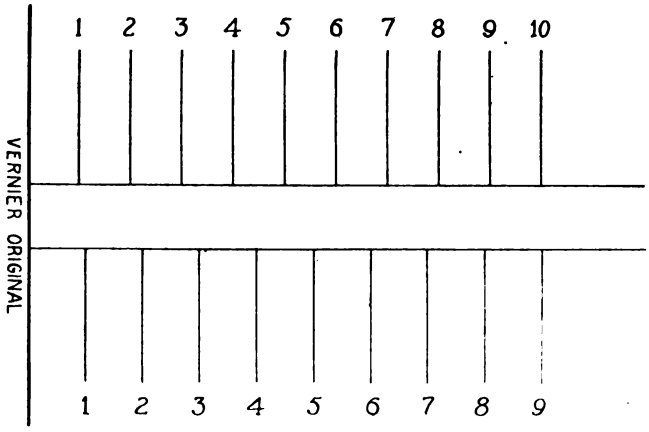


Fig. 8—Showing Divisions on Vernier Scale as Compared With Those on Thimble.

releases his grasp of the thimble itself and takes the ratchet stop between thumb and finger. This device is so arranged that it will slip when turning in the right hand direction, if the pressure exceeds a certain definite amount. Consequently, we are thus enabled to accomplish our measurements at a definite standard pressure. This appliance increases the cost of a micrometer caliper about 50 cents. Upon turning in the opposite direction, the device operates to turn the thimble without reference to the standard pressure.

A further difficulty is connected with the speed with which measurements may be made. When one reflects that the screw has 40 threads per inch, it becomes evident that to move the spindle back and forth with reference to the anvil 40 turns are required for the movement of a single inch. Consequently, if the things to be measured vary much, considerable time is lost in screwing and unscrewing the spindle. It is desirable, therefore, to be able to move the spindle through the nut otherwise than by this slow means.

Quick Adjustments.

One, at least, of the leading manufacturers has on the market a caliper with which a quick adjustment may be made. The plunger is forced in by pressing against the outer end. This operates to disengage the nut from the screw. The screw may accordingly be moved through rapidly until an approximate position is gained, when engagement between nut and screw is resumed. Final position is secured in the usual way.

It will readily be understood that a caliper will become worn, so that after considerable use the zero on the thimble will not precisely correspond with the longitudinal line on the barrel when anvil and spindle are in contact. In order to meet this matter, one of the makers provides a thin shell or sleeve which covers the barrel. The barrel markings are cut upon this sleeve, so that, when it is desirable to make compensation for wear, it may be done by turning this sleeve on the barrel to a position where zero mark and long line will correspond.

By referring to Fig. 10 we have before us a view, partly sectional, of a Starrett micrometer caliper including a ratchet device. By attending closely, a sleeve may be seen enveloping the barrel. It is upon this sleeve that the barrel scale and vernier would be arranged. It is well to note, both in this view and in Fig. 1, the great width of the frame. This is so, no doubt, for the purpose of suitably distributing the metal to resist the powerful effect of the thrust of the screw.

Now the principle of the micrometer screw is employed in various styles of calipers to meet special requirements. It is also employed where the instrument can hardly be called a caliper at all. Thus caliper squares are constructed with a micrometer device which enables the workman to measure to .001".

The scale on the square proper enables the coarser reading to be made; the micrometer attachment is then employed to determine the truth with exactness. Reference has already been made to a method of quick adjustment. Another device employed by the same firm to secure the same general result consists in the use of a plug and accurately placed holes. The one jaw of the caliper slides along on a prolongation of the other. Both this prolongation and the part of the sliding jaw which envelops it have holes suitably arranged to enable positions an inch apart to be securely made with the aid of the plug. In this way the jaws may be set for every inch within the total capacity of six inches.

The movable jaw is fitted with a micrometer head. This enables accurate measurements within the inch to be made in the usual way. This instrument does not

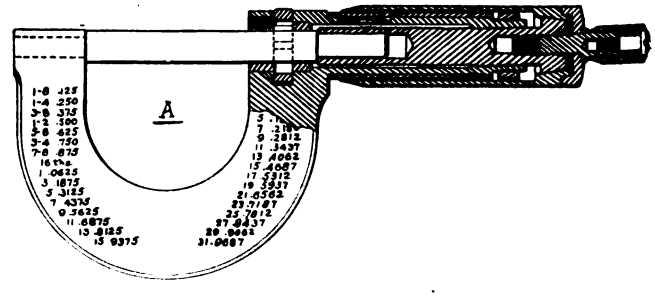


Fig. 10—Cross Section of Micrometer Caliper Fitted with Ratchet Stop

have the full six-inch capacity for round work, because of the interference of the prolongation. Round capacity is 4¼ inches. It will readily be seen that the slightest looseness in the fit of plug and hole would result in inaccuracy. The micrometer head would not nullify this.

To secure the necessary exactness of fit, the holes are provided with hardened steel bushings which are ground

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and lapped so as to make them of precisely the same size as the plug. The limitation just noticed of what may be called the throat of the caliper would interfere for such work as the measurement of the thickness of sheet metal. Special deep throated instruments are made to meet this need. Thus, one style while only having a half-inch micrometer capacity has a throat two inches deep.

The Inside Micrometer.

For the use of micrometers for inside measurements, a variation from the ordinary caliper form is desirable. To meet such requirements, micrometer heads are arranged so that they may be attached to rods of known length. The micrometer then serves to give the fractional reading with exactness. Further, the rod of fixed size may be made in sections so as to enable a considerable range of capacity. In fact, instruments have been made whose maximum capacity amounted to 57, 82 and 107 inches. Such instruments are in use by the United States Government.

In fact, micrometer heads may be obtained which may be attached to machines or tools and thus afford a means of accomplishing fine measurements. This is a use which has not yet become as general as the employment of the standard forms, but no doubt the future will see such devices increasingly used as their possibilities become more commonly known.

Sometimes it becomes desirable to know with exactness the depth of a depression. A special form has been devised to deal with this need. A micrometer head is fitted to operate a spindle through a hole in a transverse piece. If one desires to know the depth of a hole, the transverse piece is placed across it and the spindle worked until its pointed foot reaches the bottom. The micrometric movement proper, however, amounts to but ½ inch. The spindle or measuring rod is provided with circumferential grooves arranged ½ inch apart. Clamping fingers are provided which engage with these, and thus the rod may be set to a point within the micrometer capacity.

One use for such an instrument is in connection with the Brinell ball test for hardness. In this test it is desired to know the area of the spherical depression made. This may readily be calculated if the depth is ascertained.

A rather difficult thing to measure sometimes is the exact size of a screw thread. Special calipers have been devised to meet this requirement. Thus, in one such device, the anvil is provided with a 60° groove. The inner end of the spindle is given a 60° point. However, the point is somewhat blunted to prevent its actual contact with the bottom of the groove of the thread. Also, the groove in the anvil is slightly cut away at the bottom to prevent contact with top of the thread. By means of these arrangements threads having an angle of 60° may be readily measured without contact of the micrometer being required anywhere except on the flanks of the threads.

SHOW DATES THAT HAVE BEEN FIXED.

January 24-30
Milwaukee, Wis. Automobile Trade Association.

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January 25-February 1
Chicago, Ill., Chicago Automobile Trade Assn.

* * *

February 1-15
New York City. Automobile Dealers' Association.

* * *

February 10-15
Kansas City, Mo. Tractor Show. K. C. Tractor Club.

* * *

February 15-22
Louisville, Ky. Automobile Dealers' Association.

* * *

February 15-22
Minneapolis, Minn. Automobile Trade Assn.

* * *

February 15-22
Newark, N. J. Automobile Exhibition Co.

* * *

February 17-24
South Bethlehem Pa. Lehigh Valley Auto Show Co.

* * *

February 17-22
Des Moines, Iowa. Automobile Dealers' Assn.

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February 18-22
Wichita, Kan. Wichita Tractor and Thresher Club.

* * *

February 24-28
St. Louis, Mo. Automobile Manufacturers' and Dealers' Association.

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March
Philadelphia, Pa. Automobile Trade Association.

* * *

March 1-10
San Francisco, Cal. Motor Car Dealers' Assn.

* * *

March 3-8
Buffalo, N. Y. Automobile Dealers' Association.

* * *

March 3-8
Columbus, Ohio. Automobile Show Company.

* * *

March 15-22
Boston, Mass. Automobile Dealers' Association.

The Constitutional Reform Association of Hongkong, China, has passed a resolution to the effect that no German subject shall be allowed to reside in their colony, or trade there for a period of years—and yet it is said that China is an unenlightened nation.

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Drove Past Standing Car: A coroner's jury of St. Louis returned a verdict of criminal carelessness against a driver of that city a short time ago. The driver is said to have operated his car at high speed and in violation of the traffic regulations, when he passed a street car which was discharging passengers. His machine struck an aged gentleman, who died later at the hospital.

A Peculiar Accident: Just as they alighted from their own automobile and attempted to cross the street, a machine, driven at a high rate of speed by an intoxicated chauffeur, drove over an aged couple, hurling them in front of an approaching trolley car. The trolley car also ran over them and mangled them badly. Later the driver was located and arraigned for homicide.

Driving Without a License: Early this month a driver of an automobile ran down and killed a 13-year-old boy who was riding a bicycle at the side of the road. Witnesses say that the machine was being driven at a speed approximately 50 miles an hour and that the driver did not seem to have control of it. Investigation by the police showed that the driver had just been refused a license by the State Board because he was unable to satisfy them that he knew how to operate a machine. Notwithstanding this, however, he drove his car without a license.

Car Hits Train: Underestimating the speed of an onrushing train, the driver of a car in Wilmington, Del., endeavored to cross the tracks ahead of it, and struck it between the tender and the baggage car. Before the train could be stopped, nothing was left but a mass of debris and mangled flesh. So complete was the wreck that it was impossible to determine the make of the car, and the man was identified with great difficulty.

One Killed; Five Hurt: Six soldiers hired a car and were in a great hurry to reach Camden, N. J., but their plans were somewhat upset when the car, going at sixty miles an hour, skidded on an asphalt roadway and turned over several times, landing twenty feet to one side of the road. One soldier was pinned beneath the car and killed. Five of the occupants were injured. The automobile had struck a slippery spot in the road, and then skidded. The driver of the car, who was not injured, was held, charged with reckless driving. The injured soldier was taken to Camp Dix in an ambulance.

An Intoxicated Driver: A man of Indianapolis is being held on a number of charges, and when he gets over his "spree" he will find that they are drunkenness, malicious destruction of property, and operating a motor vehicle when under the influence of liquor. This driver was operating his machine at a high rate of speed, swerved from the road, jumped the curb, went across a lawn, and crashed into the front room of a house. The floor in the front room was torn up, windows shattered, furniture and pictures broken. The damage was estimated at approximately $400.

Driving While Intoxicated: After having imbibed very freely of the certain something which will be scarce at the end of July, a jitney driver of San Francisco was driving along at such a leisurely pace, that he collided with a car standing at the curb, and sent it skidding across the street into the front of a building. A passenger of his own car was thrown out and badly injured. The car with which he collided was completely wrecked. The judge will most likely give him plenty of time in which to repent, and incidentally, sober up.

A Strange Accident: A car driven by a woman was proceeding down one of the main avenues of New Haven, Conn., when it struck a man, who, to save himself, grabbed one of the fenders and was dragged along. A part of his body is said to have struck another woman alighting from a trolley car, knocking her down to the pavement, the wheels of the car passing over her body. She was seriously injured, but the man sustained a few cuts and was treated in a nearby drug store. The driver was arrested for reckless driving and failing to produce an operator's license.

Driving Recklessly: A car driven by a naval man of Philadelphia, Pa., struck a mounted policeman, killing his horse, and injuring him. Witnesses claimed that the car was being driven recklessly, and there are further charges against the driver of assault and battery.

A Proficient Pupil: An automobile concern of Portland, Oregon, undertook to teach a man of that city how to drive their machine (if he bought it) in one lesson; said lesson consisting of instructions for stopping and starting the car. He was then declared by the instructor as able to drive the machine. While showing off his newly acquired knowledge, he forgot how to stop, and ran over a man and his wife. They were badly shaken but not seriously injured.

Ran Down Child: A chauffeur ran down and seriously injured a child in New York City a short time ago. The injured child was picked up by a soldier in a passing automobile. The driver was charged with having recklessly driven his car.

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The Care and Repair of Tires

Part 1.—Dealing With the Construction of Tires, the Different Types, and the Curing of the Rubber

BY W. E. FABER

THE late George Fitch described the pneumatic tire as the "turkey buzzard in the ointment of the automobile owner." Most motorists will agree with him that tires cause the larger portion of the troubles that help to make the operation of a car retain the element of interest and uncertainty that has been a part of it since the days when exhibitors at the automobile shows demonstrated their creations by driving them around an indoor track, that was built for the purpose, adjacent to their booths.

Tires have their faults, it is true. But probably not less than ninety per cent of the failures of tubes and casings to give the service that is expected of them are due to mistreatment that follows a lack of understanding of the proper use of tires or just to good old-fashioned neglect.

It is really marvelous, when one stops to consider it, how a combination of vegetable products, the sap of a tree and the gossamer-like fiber from the seed-pod of a little bush, can endure with even a moderate amount of resistance the thundering impact of a two-ton car that is driven at railroad speed over roads that would destroy a tire of steel in a comparatively few hundred miles.

Preliminary to treating of the factors that cause the untimely deterioration of tires and the methods of coping with them, it is interesting to know something about the construction of a tire and the materials that enter into it. The average driver sees only a tube and a casing that he pays for and puts on the rim with a silent prayer that "this one will give some service."

Tire Construction.

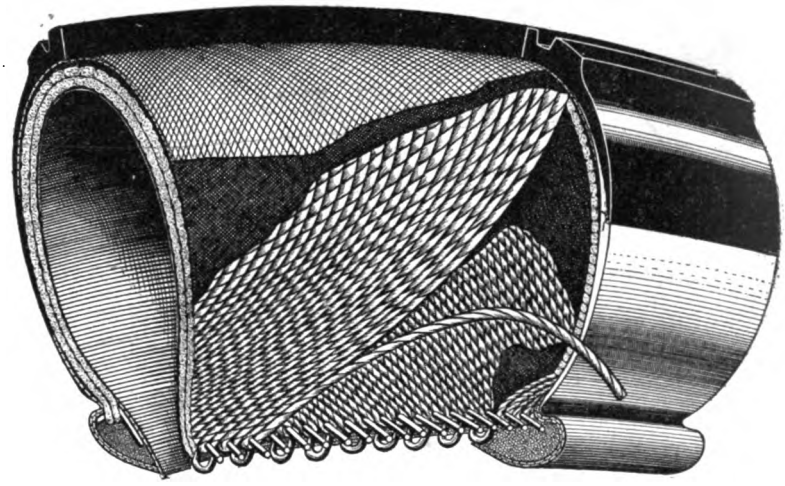
Generally speaking, a tire consists of an outer casing of fabric covered with rubber, providing the tensile strength to hold the internal pressure and the resistance against road wear; and an inner tube of softer rubber serving as an air-tight lining to prevent the air from escaping. When such a tire is placed on a wheel and inflated, the effect is that the wheel is actually suspended on compressed air, the most elastic substance that is commercially available.

Slight shocks, which in the case of a solid tire would be transmitted in a direct line to the axle and thence to the body of the car, via the springs, are absorbed by a slight distortion of the air chamber.

The size and construction of tires have been so standardized that a study of any make gives an excellent idea of all makes. It is true that each maker has secret formulas for the compounding of rubber to obtain toughness, resiliency, etc., but the finished tires show little difference in the main.

Casings fall naturally into two divisions, those in which layers of canvas are used to give the strength, and those which are constructed of layers of parallel cords. Tire-makers say that the advantage of the former, and in fact its only excuse for existence to-day, is its low initial cost. The cord construction, while more expensive per tire, seems to offset this by the increased mileage which it gives and the smoother riding qualities it possesses by virtue of the fact that it does not need to be inflated as tightly as the fabric tire in order to prevent breaking down of the internal construction.

Both kinds of casings are made in three styles; they differ principally in the shape and construction of the beads, in other words, in the method of attachment to the wheels. The *clincher* tire has soft beads that permit it to be stretched over the rim of a wheel just the same as one would stretch a rubber band over a spool. This



Partial Cut-away Section of Goodrich Cord Tire, Showing the Two-ply Construction of Their Silvertown Tire.

style is now used only in the smaller sizes of tires such as are on Ford cars where the expense of any but the simplest rims would be prohibitive.

The *Quick Detachable Clincher* (known as the Q-D) has beads shaped the same as the regular clincher, but instead of being elastic, these beads have steel wires built into them. In placing this tire on the rim one side of the rim is removed and when replaced is locked by means of a spring or other device. The *Straight Side* tire also has a non-stretchable bead, but of different form, and is used on special rims somewhat similar to those used with the Q-D type.

Tread patterns are almost innumerable, apparently being limited in design only by the imaginations of the

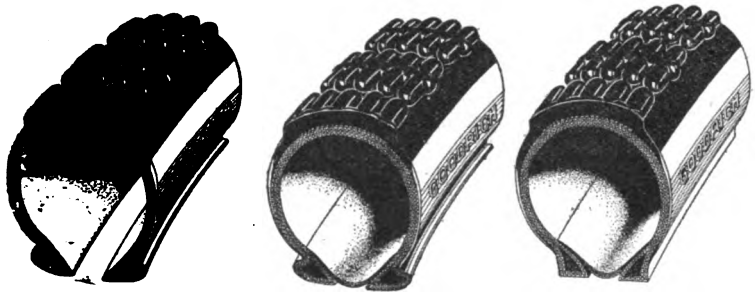
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manufacturers. They offer a means of adding to the thickness of the tread without making the tire unduly rigid, and under some conditions are advantageous in preventing skidding.

Two Materials Used.

It will be noted that the casing is made of two materials, fabric (which includes both the cord construction and woven canvas) and rubber. The fabric is usually a high grade of Sea Island cotton, which on account of its long fibre supplies strength and resiliency. The rubber merely holds the layers of fabric together so that they stretch and bend as a unit, and protects the fabric from actual contact with the road and from the deteriorating action of water, oil and other enemies.

The rubber has practically nothing to do with the shock-absorbing ability of the tire. That is all left to the air inside of the tire, and the chief function of the casing is to keep the air inside. It appears that if it were possible to make a tire as thin as this sheet of paper, yet with strength enough to resist puncture, we would have the ideal, so far as easy riding is concerned.



Regular Clincher, Q. D. Clincher, Straight Side. Cross Sections of Goodrich Tires.

It seems that the aim of the tire designer is to use as large a volume of air and as little canvas as possible consistent with adequate strength.

In making a casing, an iron core or mandrel, ring-shaped and having a cross section the same as the inside of a tire, is covered with several layers of fabric which have been thoroughly impregnated with rubber. From four to six layers are used, depending on the size of the tire. These are each carefully rolled and pressed together and as the fabric is applied it is continually stretched so as to eliminate stretching in use. On the fabric is placed a ⅛ inch layer of soft cushion rubber and over this comes a loosely woven strip of fabric—the breaker strip. Then comes the tread, compounded of tough rubber to stand the wear of the road. Of course the beads have been applied during the process of laying on the fabric.

Vulcanizing or Curing.

The next process is the vulcanizing or "curing" of the tire. (Some manufacturers partially cure the fabric body of the tire and the tread separately and then vulcanize them together later.) This is simply a matter of applying heat at a certain temperature while the tire is kept under pressure in moulds which determine its shape when finished, much as a waffle is moulded. Just as in culinary processes the temperature and the length of time heat is applied are vital to the success of the result.

In building tires by the wrapped tread method which is almost universally used for smooth tread tires, the pressure on the tire is obtained by wrapping it while on its iron mandrel with strips of muslin. Afterward iron moulds conforming to the finished product are clamped tightly over the wrappings. The whole affair, moulds, tire and mandrel, is then placed in a large cylindrical tank much like a boiler and large enough to hold many tires at one time.

Heat is applied for about an hour by admitting steam into the sealed tank at a pressure which corresponds to a temperature of approximately 300 degrees F. The steam itself has nothing more to do with the vulcanizing process than to distribute the heat uniformly over the tires being cured. Hot dry air, or any other method of supplying heat would serve the purpose equally well if means could be provided for a uniform distribution of heat.

The fact that steam, on account of its convenience for this purpose, is commonly used for curing rubber has misled many people into the belief that the steam itself had some mysterious chemical influence, or supplied moisture that prevented overcuring, but this idea is entirely wrong. At the temperature used in vulcanizing, steam contains less moisture than average illuminating gas. It is practically dry. Maintenance of the proper temperature is the important point.

The Inner Tube.

We have seen that the rubber used in casings is of a tough variety designed to stand the wear of the road. On the other hand the inner tube, which is protected from outside damage, and must remain absolutely air-tight, is made of quite a different kind of rubber. A very elastic compound is used, so strong that a good tube may be inflated until it is more than a foot in diameter without bursting. Demonstrations have even been made in which the weight of a loaded car has been suspended in the air by means of an inner tube, and most of us have seen cars towed by using a tube instead of a rope.

Inner tubes are made on mandrels, too, but in this case the mandrel is a piece of steel tubing of proper diameter, straight, and of a length equal to the circumference of the completed tube. This mandrel is put into a sort of lathe and as it revolves the raw rubber in narrow strips is wound upon it. Several layers of very thin rubber are applied to insure freedom from leaks that might occur if only one layer were used, and then strips of cloth are wound on top of the rubber to give the pressure that is required.

Curing is accomplished by inserting a hundred or more of these mandrels into a steam-heated chamber for a suitable length of time. When the cure is completed the

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cloth is unwrapped and the rubber is stripped from the mandrel by turning it inside out, which accounts for the tube being smooth on the outside and rough inside. Then the ends of the tube are vulcanized together either by heat or by chemical means, a valve stem is attached and the tube is ready for use.

The matter of color in tubes and casings was discussed quite widely a few years ago. The natural color of pure rubber is a sort of amber. Some of the colors that appear in finished tires are the result of using chemicals that affect the properties of the rubber and others are merely a disguise to trade-mark a certain brand of tire. The only real proof of a tire is the service it gives, and if the tire is made by a reliable manufacturer and given reasonable care by the user, the service will, aside from unavoidable accidents, be all that can reasonably be expected.

(To be continued.)

*Editor's Note:—Mr. W. E. Faber is the Advertising Manager of the C. A. Shaler Company and is considered a high authority on tire construction, repair and vulcanizing. Mr. Faber has written for many book publishing houses and delivers lectures at the University of Wisconsin. We are indeed fortunate in obtaining this series of articles from Mr. Faber and we are sure that our readers will appreciate his work.

How To Lay Out and Cut Shaft Splines

This Work May Be Done by Any Repair Man in a Shop Equipped With a Small Milling Machine or Lathe.

BY AN OLD REPAIRMAN

SO many shafts and axles are now made with multiple splines that the cutting or re-cutting of them is a daily job in all large repair shops. Because the splines are rarely full length, a shaper is not adapted to the work. A milling machine is required, with more or less elaborate fixtures. To handle the longest splined shafts, a No. 3 miller is needed, but the cost of this and accompanying fixtures is prohibitive for smaller garage shops.

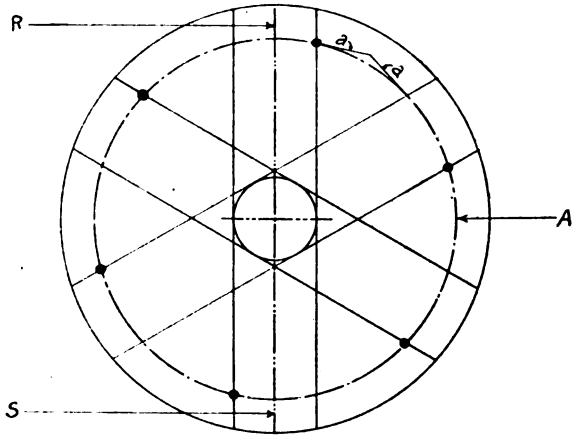


Fig. 1—The End of the Shaft Properly Marked for Splines.

It is the purpose of this article to describe tools and methods that are suitable for the garage of limited capital as well as for the larger ones. The entire outfit of tools may be bought for fifty dollars or less—it is assumed that the shop boasts some kind of a miller—a machine tool that is of even more importance than a lathe for repair work. Axles and shafts are parts that can be made as well in the repair shop as at "the factory" and the value of avoiding long and uncertain delays is a strong point in bringing more work into the shop.

Once in a while a factory shaft comes too large in diameter due to some change in sizes. After the outside diameter has been reduced in the lathe, it is necessary to deepen the splines, which is comparatively simple, for the existing ones serve as guides in setting up. The underlying principle of setting up and cutting is the same as for new shafts—to follow.

The layout for a six splined shaft is shown in Fig. 1. A center line is first scribed across the end of the shaft, using a center head of a combination square for the purpose, and a second center line made at about right angles to the first. About the center thus located a circle is scribed having a diameter equal to the width of the splines to be. Another circle as A may be drawn, the size of the bore of the sleeve into which the shaft is to be fitted.

Lines parallel to the center line and tangent to the inner circle, lay out two opposite splines, R and S. Taking the intersection of one of these lines with the circle A as a center for spacing off and with a radius equal to the radius of A, six points are located which are on the lines passing across to the other splines, and these can be drawn.

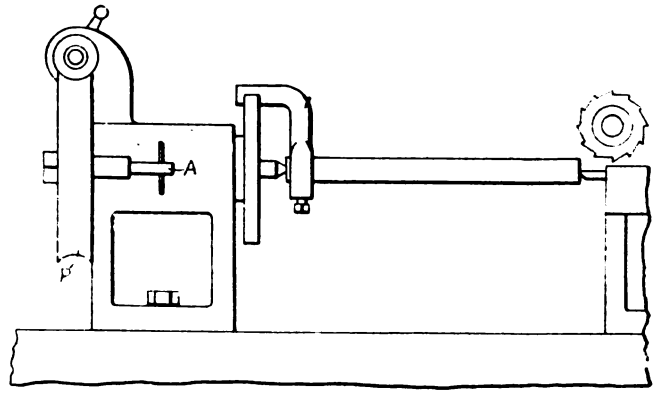


Fig. 2—Method of Mounting in Miller.

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Six divisions are most easily laid out by using this radius of the circle for a spacer. Eight divisions can be obtained by two center lines at right angles, checked with dividers until correct, which gives four equidistant points, and these four are then subdivided. A ten spline shaft is laid out by one center line and dividing the semi-circles into five equal divisions. A twelve spline layout is made by dividing each of six into two parts.

Direct Indexing.

Fig. 2 shows a shaft set up ready for milling "on the centers." Such an arrangement is always best where the miller is large enough. A pair of plain index centers are all that any garage shop needs and they are far cheaper than the more elaborate sets. An index pin A engages the rows of holes in the plate P, a circle of holes being selected which is a multiple of the number of divisions to be cut. The plate P is fast to the spindle; It is turned directly or in some constructions is worm

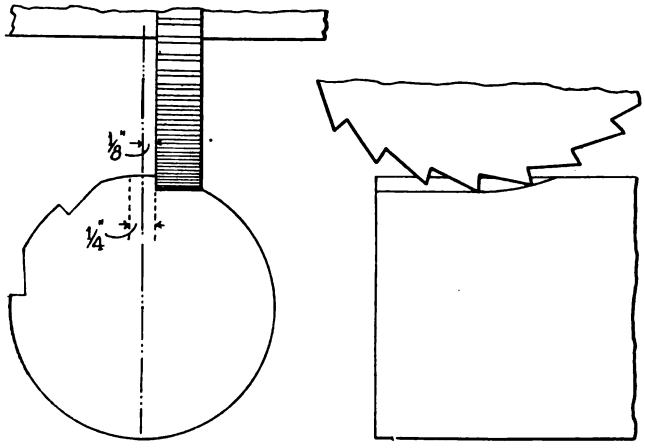


Fig. 3—Location of Cut, Using Single Cutting Wheel.

driven as shown. This method is called "direct indexing."

Each spline occupies the position of an inserted key if the construction were built up instead of solid; hence the edge of the cuts are in the same position for each case but with one it is an inside cut and with the other an outside cut. Fig. 3 shows this. The spline is to be ¼ inch wide and so the nearest edge of the cutter is ⅛ inch away from the center line (no part of the cutter is ever nearer than half the width of the key). Three cuts have been made in Fig. 3—all on the same side of the center and after the remaining five have been made in the same way, the position is changed to the opposite side of the center and eight cuts made there, completing the shaft.

The sides of splines are never on a center line, but parallel to it as has been shown. To get this result, care must be exercised in setting up other than to have the cutter so far from a laid-out center. One way is to rest a square against each side of the shaft in turn and to turn the shaft until the distance is the same from the square to the line at each side of the spline—this is probably the shortest way for all around use no matter how the shaft is held.

Another way is shown in Fig. 4 where the shaft is gripped in a vise and rests on a parallel piece H. In this

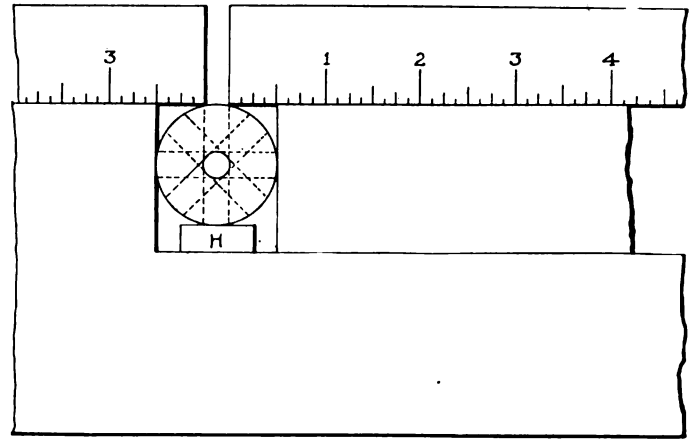


Fig. 4—Method of Laying Out Splines.

case the splines are all laid out. Then a measurement is made and the shaft set so it is the same at both sides, measuring from the vise jaws as shown. This must be repeated for each side of each spline.

A Few Extras Are Handy.

A few simple accessories will materially shorten the time it takes to finish a shaft. In addition to the time saved, a machine that is badly needed for other jobs will be released just that much sooner. Then too, the chances of errors with an inexperienced man are lessened in proportion as the work is made simpler.

Half of the indexing or the setting by measurement may be saved by using two cutters on the miller arbor and finishing both sides of a spline complete at one cut. Fig. 5 shows this arrangement. The two cutters of course must be of the same diameter. Then several col-

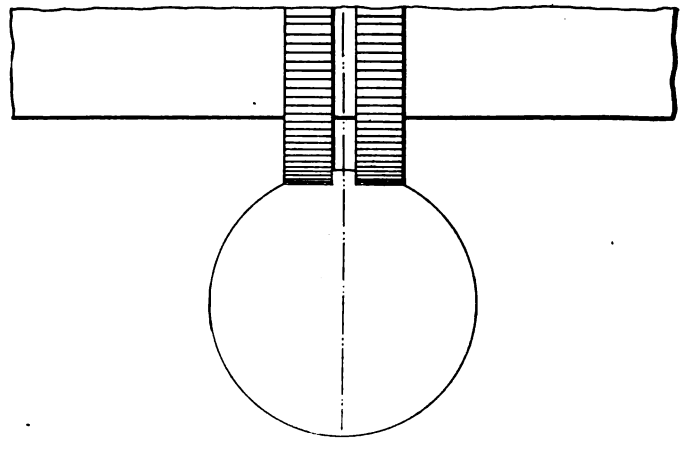


Fig. 5—Cutting Spline with Two Cutters Mounted in Gang.

lars to go between the cutters must be provided, the widths to be standard sizes like ¼ inch and ⅜ inch, such as are the keys they are to straddle. Collars and cutters need not cost over five dollars. In setting up, each

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cutter occupies the position that the single cutter on each side would, i. e., nearest edge half the key width from the center line.

Factory made shafts are cut with a cutter that forms true arcs between the splines. These arcs are like the circle A in Fig. 1. Repair shop shafts approximate these arcs by cutting two or more flats as a-a, Fig. 1, and by either a third cut in the center to take down the ridge or by filing it down. The faces a-a are left by the cutter as it mills the sides of the splines—sometimes the cut is made deep enough so that the point of the cut is the full depth of the circle A, which makes further dressing unnecessary.

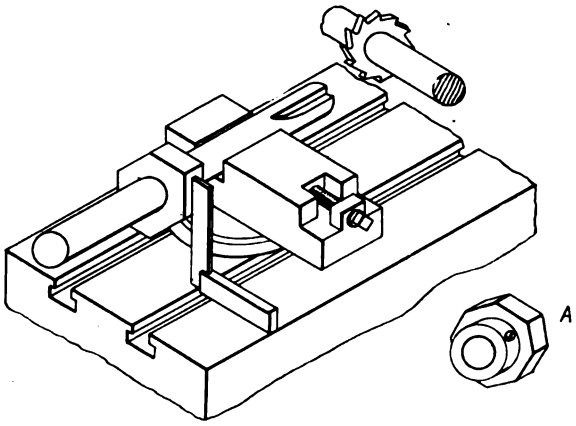


Fig. 6—Cutting Splines on Lathe, Using a Hex Collar.

Splining Long Shafts.

Long shafts cannot be handled between centers on a small miller, and some shops have no centers at all. It is for such cases that the full layout is made as in Fig. 1 (for a shaft on centers but one spline needs to be located, the index head repeating this layout automatically for the rest). Shafts thus cut must be held in a vise, or chuck, or be clamped directly to the table of the miller. Fig. 6 is a way of avoiding the tedious layout on such shafts once and for all.

Three cast-iron index collars are made up as shown at A. The hole is made as large as the largest shaft it is intended to handle, the outside diameter of the hub part sufficient to give set screw length, the size of the flattened part preferably three to five inches, and the length as desired though a total of one inch is enough. One collar should have six sides, one eight, and one ten—divisions of three, four and five can be obtained by alternating. These collars may be provided with a set of bushings to fit standard sizes of shaft from one inch up, or a long enough set screw may be provided to compensate alone for the different diameters, though this is the poorer way.

The method of indexing with such equipment is shown by Fig. 6. Lines for one spline were scribed anywhere on the shaft and the latter centered in the vise and with the cutter from them. Then the indexing collar is put on the shaft and the set screw tightened when one face is true with the square as shown. After one cut is made, the shaft is turned until the next side of the collar is square and then a second cut is made. This is repeated until the cycle is completed. It would make no difference in indexing whether one cutter (as shown) is used or two as in Fig. 5. If the garage shop has no means of accurately facing the flats of the collars, any machine shop can do it quickly and when ready they form a simple and accurate means of indexing for a variety of jobs.

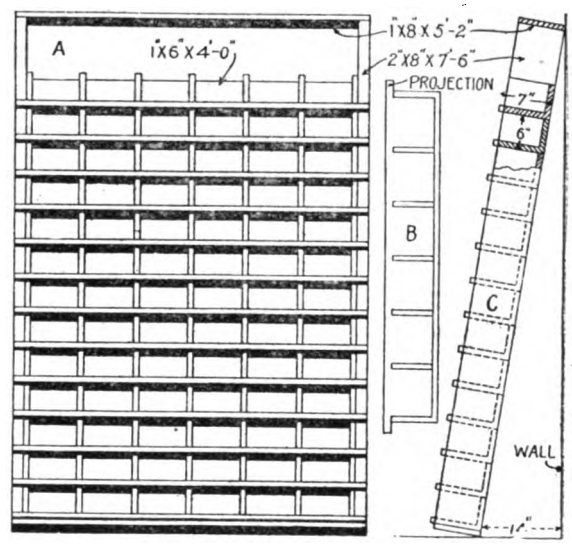
Whatever the method followed, once a setting is made for position and depth no alteration need be made for the rest. The superiority of the splined shaft over the one with inserted keys has resulted in its rapid ascendancy and the effort to be in a position to turn these out on a commercial scale will be worth while in every respect.

A HANDY BOLT RACK.

One of our subscribers, who formerly was a blacksmith, a short time ago forwarded us a sectional model of a bolt rack that should be of interest to every owner of a repair shop, machine shop, or garage.

This bolt rack consists primarily of a heavy frame, made of planks 2 by 8 inches, 7½ feet in length for the sides and for the top and bottom, planks one inch in thickness, eight inches in width and five feet two inches in length.

This frame may be bolted to the wall, or stood upon the floor as shown in the figure at A. The compartments, one of which is illustrated at B, are in sectional form; that is, each shelf is independent and made from a flat board one inch in thickness which has been cut so as to leave a projection upon each end as shown at B. Upon this base are constructed the division walls and the back of the bins.



A Handy Sectional Bolt Rack.

Only the sides and backs of the bins are provided for each section, for the bottom of one section forms the top of the one below it.

These bins may be made in varying sizes and stacked in the big frame, one upon the other as shown in the illustration at A and at C.

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MISSING NUMBERS—Our readers are requested to remember that we are always pleased to re-send numbers which have gone astray in the mails.

The Passing of One of the Country's Greatest and Ablest Statesmen.

AS this magazine goes to press, we hear of the death of one of our most beloved and honored citizens, the Ex-President, Colonel Theodore Roosevelt. Without doubt, Colonel Roosevelt has been one of America's greatest patriots. Truthful and just, he has always placed the welfare of the nation before personal aspirations.

During his Presidency he proved himself to be the people's advocate, fearlessly fighting their battles, unafraid of capital, and equally honest in his convictions upon the side of capital when it was in the right. He did his duty as he saw it, showing favoritism toward none, dealing out justice to both friend and foe alike.

He was gifted beyond the average man, in that he could look upon the country as a whole, see what was fitting and best for the masses, and act accordingly, not permitting the feelings of a few to alter his purpose.

Colonel Roosevelt was one of the few who are able to draw conclusions from current events and forecast the future happenings. He alone of all our statesmen realized the value of preparedness and had the courage to speak his opinions. That he was right has been proved.

America should mourn his loss the more deeply because she owes him a debt of deep gratitude. He did much to further the cause of Liberty and Justice and to arouse the people from their lethargy and free them from the shackles of Pacifism.

The American people have lost one of their best friends.

A Word Relative to the Increased Subscription Price of This Paper.

ON page 36 of this issue, we announce the increase in the subscription rate of this magazine. We have taken this step only after much careful thought and contemplation. We feel sure that we will not lose a single friend by this increase, for the very reason that we intend to give full value for every cent received.

In all justice to our subscribers, we could not put out another number without decreasing the quality of the reading matter, at the old subscription price. We know that our readers are entitled to the works of the best authorities, and are willing to pay for such articles.

We have always strived to keep the Automobile Dealer and Repairer the BEST magazine on the market in its field. A magazine that would be awaited eagerly by all the subscribers, a paper that would solve the problems of the perplexed motorist and an authority on automobile subjects of a mechanical nature.

We do not claim to publish an ornate collection of photographs in every issue; we prefer to spend our subscribers' money for timely mechanical articles. We do claim that the motorist who subscribes to our magazine, and reads it thoroughly, will save many times the cost of the paper.

If Our Workmen Desire High Wages They Must Put Out Good Work.

THERE is an old saying "Anything that is worth doing at all, is worth doing well," and this adage should be brought to the attention of the American laboring man. Gompers has stated that Labor will never permit Capital to reduce wages and salaries to a pre-war basis. If he is right, it is high time that Labor and Capital reached an understanding with each other.

By and large, the American worker has formed the habit of carelessness. He is not wholly to blame, for the habit has been forced upon him. The employer has demanded increased production, has eliminated the personality of the man and reduced him to power units. has made him a machine and taken away the incentive for improvement.

There has been, and still is, a lack of co-operation between Labor and Capital. If America expects to lead the world in production and commerce, she must remedy this defect and consolidate the interests of the two.

No matter what the attiude of Capital, Labor must cure her careless habits. The American laborer must school himself to do his best work. He must strive to produce only the best.

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The writer has in mind an example which will serve to illustrate the point we are considering. For nearly five months he has purchased regularly, safety razor blades from a prominent manufacturer of such articles. It so happens that this maker is the only one who produces the type of blade that will fit his razor. On an average only one out of twenty of the blades is fit to use.

Undoubtedly such a low percentage of good blades will be noticed by the trade at large and within a short time no one will purchase either this razor or blades for it. The manufacturer will either be forced out of business, or into another line. His employees will suffer by the change, even if they do not lose their positions.

In this case, is not the laboring man to blame? Evidently he is not doing his work to the best of his ability, and in the long run, he will suffer through his own carelessness.

There are thousands of such examples to be found in the country. Industries which never seem to grow, but which flourish for a brief period, then drop into obscurity. It is a phase of the present Labor question that should deserve considerable thought by the workingman.

Protect American Labor and Industry.

WHEN the great European war broke out on the first of August, 1914, this country was in the midst of a serious business depression. Industries everywhere were either curtailing their output or were closing up entirely from lack of orders. Thousands of men were out of employment and soup houses were being talked of and established in some places. It has been claimed with considerable reason that the Underwood Free Trade Tariff measure which had been enforced for some time was the cause of the depression which had spread over the country. Goods made in foreign countries by cheap labor had been sent over here in large quantities and were supplanting similar goods made by our own people.

During the year 1914 Bradstreet reported 427 failures in the entire country for one week in December of that year. For the corresponding week this year the failures were 162. Of course everybody knows that the war stopped the importation of goods from foreign countries to a large extent, and had very much the effect of a protective tariff, with the result that our manufacturers were once more in a position to take orders and fill them and our people were employed fully everywhere.

The war is now over and the Underwood Free Trade Tariff will soon commence once more to get in its deadly work, unless Congress enacts a satisfactory tariff law to keep competing goods out of the country. As the next Congress will be Republican is can be assumed that such a tariff will be put through as soon as possible, but unfortunately this Congress will not meet for work until December, 1919, unless called in special session by the President, so that the country is apparently exposed for a year to the blighting effect of the Underwood Free Trade Tariff measure.

The Important Part That Automobile and Accessory Shows Play in Motordom.

IF one has given but little thought to the matter, he is prone to feel that an automobile or accessory show is a waste of money. One is apt to think that the only persons interested in such exhibitions are those who intend to purchase.

No matter whether one is a grocery store clerk, a bank cashier, an insurance agent or a furniture manufacturer, an automobile or accessory show can be made of value to him. All statements to the contrary, notwithstanding, an automobile show or an accessory show or a truck show, is as much value to the business man, if he knows how to make use of it, as it is to the exhibitors.

Every man, if he is enterprising, expects at some time to own an automobile and one has but little patience with a prospective car buyer if he doesn't know what kind of a car to purchase. Naturally, if one does not keep himself informed, he cannot expect to make a satisfactory decision.

And to inform prospective car buyers, is one purpose of the automobile show. Contained in one building, usually within a few yards of each other, are hundreds of different cars. Comparisons may be made with ease and in a minimum amount of time. The buyer can visit back and forth and once he has purchased, he feels secure he has purchased the car that he knows possesses the greatest number of points he desires.

Questions brought into his mind by the statements of one salesman, can be answered within a minute by the salesman of the other car.

Perhaps one has no idea of buying a car; even so, however, he cannot afford to ignore the show. As a business proposition, if one were a bookkeeper he would keep informed as to modern office methods. So it is with the business man. The automobile may be considered as a business necessity. It may be of value in your business. You may find, upon investigation, that with such a machine you can increase your business and profits many times.

If you are an employee, you have a duty toward your employer. Keep informed as to business equipment. Find out what can be done with trucks or automobiles. If you can install equipment that will save your employer money or increase his business, your own value increases in proportion, if not to him, to someone else.

Of equal value is an accessory exhibition. You can no more afford to neglect this department than you can afford to neglect insurance. There are upon the market accessories which when placed upon certain cars will increase mileage and decrease gasoline consumption nearly 100 per cent.

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Not long ago the writer's attention was called to the fact that there was a difference of fifteen dollars in the prices of two necessary accessories. The total cost of the more expensive was eighteen dollars, while the three dollar article, in the writer's estimation was just as good if not better than the more expensive one. At any rate both accessories gave an equal amount of service by actual comparison.

A HANDY FIXTURE.

The writer was in a small garage a short time ago and noticed that the workbench was singularly free from unsightly dents. Investigation showed that the owner had obtained a twelve inch section of an ordinary rail, from the railroad agent, and had bolted it to the end of the bench.

Locating Grounds and Short Circuits

How An Enterprising and Intelligent Farmer Uses the House Telephone To Locate Electrical Troubles.

BY JAMES F. HOBART, M. E.

THE town dweller, and user of an automobile, may consider himself in luck. In case of trouble, he can step around the corner to a garage or repair shop and get things fixed in a jiffy. But in the country, O me! O my! Here, eight miles from the railroad, except in one direction where it is ten miles! With no Sunday paper and no daily paper between Saturday and Tuesday noon, the repair shop is rather an unknown quantity, to say the least!

On this 300 acre farm where the writer has been visiting for several weeks, there is a good automobile, which, like all others, has its troubles occasionally or oftener, and when the starter went bad one day recently, there was some lively hunting for leaks. A test of the storage battery electrolyte showed the proper degree, and the farmer was at a loss to determine where the trouble was.

He tried sparking across the storage battery terminals with a bit of wire but, while he got a good spark across the terminals, he failed to get much while sparking across each cell. Too low voltage to show much spark. To overcome this difficulty, he took an old jump spark coil, attached two wires to the terminals, placed the coil out of the way on a bench and used the terminals of the wires as test points.

The "kick" of the spark coil caused a much more visible spark when the test terminals were scraped across the storage battery terminals and in this way, he was able to determine that a cell at one end of the battery did not show as much energy as did the other two cells. Here was a clue to work on and after hunting for short circuits in vain, the farmer sat himself down and began to make deductions—something which should be done first of all when trouble is met with—and to reason from effect to cause.

"Circuit's all right," he remarked. "Ignition works well but is weak. Horn blows all right, lamps glow, but a trifle dim. Self-starter won't work at all, so trouble must be right in one cell of the battery, or mighty close to that point!" And taking a wrench to the battery terminals, he removed one of the cables which led to the starting motor and its connections.

"Might as well start right here," he continued, "for if the trouble isn't inside of the storage battery, it must be mighty close by on the outside." Then he wiped the battery connection clean with a bit of clean cloth and wiped along the armored cable towards where it connected with the starter push-button. About five inches along the armor, his finger sank into a depression in the armor. He was interested at once, and wiping that part of the armor very clean, he examined it closely and found to his surprise that a hole had been worn right through the armor, A Fig. 1. through the insulation B of the cable and the cable C itself had been brightened!

Repairing the Break.

"Somethin' doin' right here," grunted the farmer, then he began to look for the object which had drilled the hole through the armor. He found it in the other terminal of the cell to which the worn cable was attached. The armor had been resting upon that terminal and vibration of the car had caused the terminal to wear a hole in the armor, and as stated, clear through the insulation so a short circuit of the end cell was formed through the cable.

The farmer said something forcible, covered the hole in the cable with tape, D, then wound some wire around the cable, outside of the armor, thus repairing the damage. Then, to prevent a repetition of the trouble, he selected a piece of stout sole leather, E, scarfed the ends as at F, with a carpenter's jack plane, wet the leather and wound it around the repaired place in the armor. The leather was cut just long enough so that when scarfed and lapped, it laid evenly and smoothly around the cable. Then some copper wire, G, was wound around the leather, five or six coils of the wire at each end of the leather and about three inches apart; the wires being placed in such a manner that they came on either side of the cell-terminal and there was no danger of ever wearing through the copper binding wires. To make sure that the wire would never come off, even though one coil should become broken or worn through, the farmer got out his soldering copper and ran on a streak of solder clear across the wire winding. Then, should one wire

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break, it was still held to the others and the winding could not loosen and come off of the leather.

The farmer "allowed" that the mending would "hold for a while" and, taking the hint, started to look over all the other armored wires attached to the automobile. And he found something. Working along the ignition wire, something was found right where the wire passed into the engine compartment. Right under the end of the hood, the wire rested against a steel angle which

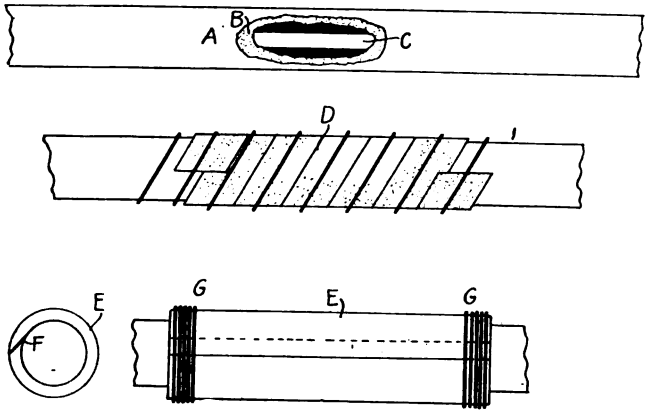


Fig. 1—How the Pipe Was Repaired.

supported the frame portion of the "dash," and there it was found that the steel angle—not a sharp corner either—had worn a hole through the armor but had not perforated the insulation. A similar treatment was applied to this embryonic short circuit, and the search was continued and revealed two other places where the armor was slowly but surely being perforated.

Hunting "Grounds."

This farmer said that he "had some derned suspicions" that there might be some grounds in the ignition or lighting circuits, and he was "sure goin' to hunt 'em right out." And he went at this work in a mighty original way. He went into the house and came back, bringing the telephone receiver A, Fig. 2, which he had removed from the rural line instrument in his living room. "Yep," he said—they can ring us up all right but we can't hear them talk until I put this here phone back agin but it won't do much harm to cut off the "Daily Gab" for a few minutes."

Then the farmer took the two wires, B, which had been attached to the old spark coil, and connected one of them by means of a little clamp, C, to one of the telephone wires, D. The other end of that wire was attached to a terminal of a dry cell, E, which had been placed on the bench where the spark coil had laid. The other wire was attached to the other terminal of the dry cell and its free end carried to the engine, F, and grounded securely. Then, with the telephone receiver to his ear, the farmer-man went all over the electrical connections of the automobile. He touched each binding post and spark plug and went over the storage battery terminals and all the timer connections which he could reach. He used the free connection G from the receiver to do the testing act with, and whenever he heard a noise in the receiver at his ear, he knew that his fingers were drawing the contact over a section of electrical work which was in some manner or other, grounded to the engine.

He had not tested many parts when he heard a tremendous scraping and banging in the receiver. Just then, the farmer was drawing the contact point over the end to a spark plug. He at once detached the ignition wire from that plug and then drew the point across the plug again, taking care not to touch that portion of the plug which was screwed into the engine. He heard the same noise in the receiver. Then, he scraped the 'phone wire across the end of the wire which had been disconnected from the spark plug, but did not hear any noise in the receiver when doing so.

"That plug is sure grounded," said the farmer. He took out the plug in question and found it to be all covered with soot—finely divided carbon, which formed a coating that conducted the ignition current over the surface of the porcelain to the engine. The farmer went all over the wiring, as much of the timer as he could get at, and over the terminals and starting push of the engine, but found nothing wrong. Then he said he would test the wiring for loose connections.

Finding Loose Connections.

To make this test, the farmer disconnected the other terminal from the storage battery and connected the test point—from the telephone receiver—to one of the storage battery connections, and then removed the grounded wire from the engine frame and attached this wire to the other storage battery terminal. He did not actually connect these two wires to the storage battery terminals, but to the connections which he had discon-

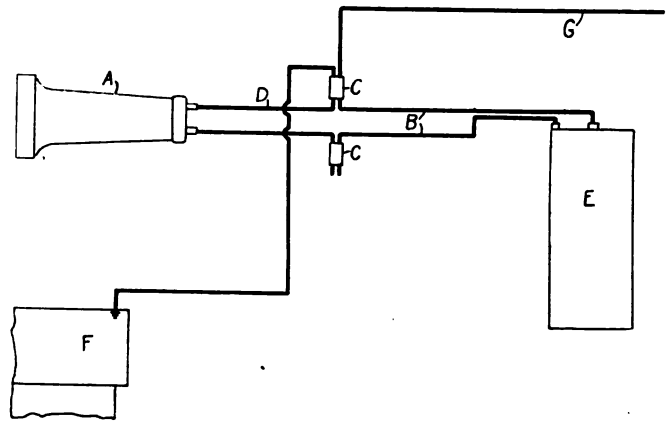


Fig. 2—Using the Receiver as a Tester.

nected from the battery, thus putting the telephone and the single cell of dry battery in place of the disconnected storage battery.

Had the farmer but known—I told him about it afterwards—he had no need to disconnect the second terminal from the storage battery. It would have answered every purpose had he simply attached one of the test wires to that terminal without disconnecting it from the storage battery; then by attaching the telephone wire to the

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other terminal, which was removed when hunting the short circuit.

With the receiver and dry battery thus connected across the line, Mr. Farmer held the receiver to his ear with one hand and with the other, he shook each and every connection of the wiring. Nothing was heard in the receiver until he reached one of the lamp connections—he turned the lamps "on" before making the loose connection test, but when he rattled the loose connection, the phone receiver rumbled and thumped like mad and the farmer knew without being told that he had found a loose connection. Whenever a loose connection was found, it was at once tightened and tested again after having been screwed up.

"At first," said the farmer, "I used to get all tangled up in the primary and secondary circuits of the spark coil, but I figured them all out and now I can hitch right on to the circuit which needs testing, and root out any loose connection instanter."

"How did you come to know of this way of testing," the farmer was asked, and he said, "Well, I first got against it by 'monkeying' with the telephone. One of the wires connected with the receiver, was always getting loose in its binding post and would occasionally fall out. I got in the habit of tightening that binding screw every time I used the 'phone, and frequently used to hear a rattling sound when I tightened the screw or when I replaced the wire after it had fallen from the binding post.

"Then, I began to investigate to see what made the sound, and found it was caused by the battery current acting upon the receiver diaphragm as more or less current passed, owing to good or poor connections at the loose contact and binding screw. Then I did some heavy thinking and worked out the loose-connection detecting stunt. After that, it was not long before I figured out that I could find a ground in the same manner, or find whether there was a ground or not, and from that, I worked out the 'stunt' of ground-hunting same as we did it a while ago."

The scheme was a good one and this farmer had worked it out all by himself although others have used the loose connection finding trick for many years. But I believe the detection of grounds by means of a telephone receiver, at least in an automobile, is novel, and originally worked up by this very progressive farmer.

Locating Spark Position.

Be that as it may, there is stil another phase of the receiver business, one which the farmer has been very close to, and actually touched without realizing the value of the method. That phase is the use of the receiver to determine the instant of ignition in each cylinder, also the advance actually made in spark angularity when running with the lever in any given position.

To do this, the spark plug to be tested must be grounded outside of the engine and the phone itself may be used to do the grounding, provided it is not easier to cut in the receiver and battery at some other place. Then, having made sure that the receiver is connected across the proper circuit, have the engine cranked very slowly and listen to the "click" in the phone which tells when the timer makes connection with that spark plug circuit. Means may be taken to measure and record this position, and when the firing points of the other cylinders may have been determined in like manner, they may all be laid down on a diagram and you will be able to tell whether or not each cylinder is ignited at the proper instant, or whether or not, as the spark is advanced, each cylinder has its ignition advanced in a regular and a proper manner.

It only requires one to listen at a properly connected telephone receiver to determine the exact time and angle of contact of the timer and by turning the crank slowly and repeating the turning movement several times, it may be known whether or not ignition always takes place at the same point. Some valuable information may be obtained by testing around an automobile wiring with a telephone receiver and a cell of dry battery.

The farmer, in making the loose connection test, might have dispensed with the cell of dry battery just as well as not. All he needed to have done was, when one terminal was removed from the storage battery, to have connected the telephone receiver, without the cell of dry battery, between the storage battery and the removed terminal. Then, the telephone would be "in series" with the storage battery and the wiring and the loose connections could have been tested out by current from the storage battery.

THE POLARITY OF CURRENT.

The novice frequently asks the question—"How can I tell the positive wire of a circuit?" Frequently when one desires to charge storage batteries from an outside source of current the same question arises, since lead wires are seldom marked.

Obtain a small glass, a drinking glass will do, and fill it with a strong salt solution, made by mixing table salt with water. An acid solution, composed of sulphuric acid and water, (electrolyte) will answer the purpose as well.

Into this liquid, dip the two lead wires from the source of current. Hold the wires about half an inch apart and you will notice that a great number of bubbles of gas arise from the negative wire, while only a slight amount of gas, comparatively speaking, is liberated at the positive side.

Water is composed of two atoms of hydrogen and one of oxygen: electrical current decomposes it, the hydrogen being liberated by the negative current, oxygen by the positive. Twice as much gas will therefore be liberated at the negative wire.

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Taken From a Mechanic's Note Book

As We Look Over The Repair Man's Memorandum Book. We Find Some Notes Regarding Lubrication.

BY J. FRED GILMAN

LUBRICATION may be portrayed as the keeping apart of two conflicting surfaces, by means of a substance, the molecules of which slide past one another with much less effort than the surfaces that they separate. In the case of the "flivver" this substance has been repeatedly defined as something necessitating the carrying of quantities of incense, thus forcing the public to disbelieve that said "flivver" is a part of the Dead Sea.

When one buys a new car he will of course follow out the suggestions set forth in the instruction book as to the kind and grade of oil to use. Each individual manufacturer determines the oil which is best suited to his engine only after long and thorough tests.

The greatest economy is effected when not a drop of oil more than is needed is used. Oil, on a part, if not absolutely necessary to it, is wasted and an excess amount of oil on a needy part does no good. On the other hand, a driver applying too little oil on a working part is most certainly courting disaster. Determining the correct amount of oil will be very easy if one will use a little reason mixed with the oil.

Watch the exhaust closely and if no smoke shows when the engine is running at ordinary speed but a faint smoke when the engine is speeded up, then one has the correct amount. If the engine smokes at all speeds, too much oil is being supplied. If, on the other hand, the engine cannot be made to smoke at all, there is great danger of insufficient lubrication and this condition should be watched and guarded against.

Some owners put oil in their engines and then wipe their hands with that satisfied feeling of work well performed. If the truth was made known to them that this was only a part of their duty, they would also consider it highly profitable to watch and see that the oil level gauge is operating properly.

Most modern engines are fitted with two danger oil alarms. One is the reservoir gauge and the other the circulation gauge. This latter gauge is of particular importance, if you are interested enough to interpret its various readings. Dirt in the oil will gradually cause a back pressure on the gauge, forcing it to read abnormally high. If there is a break in the oil line or in the pump the result is a low or negative reading.

Failure of these gauges to register is not viewed with any great consternation by the average motorist. This usually is because he does not realize that so much depends upon the lubricating system, nor does he appreciate that even the simplest, most ordinary lubricating system is a wonderful thing. The marvel is that, considering the extremely hot gases and other difficulties under which the engine is made to operate, it works at all, even under ideal conditions.

I am OIL.

*

Preventing mechanical trouble is my great specialty. I am the Guardian Angel of engine troubles.

*

Some have eyes, but see not; I have no eyes, but see.

*

When wanted I am wanted BADLY and nothing will take my place.

*

The wise motorists keep me near them on every drive.

*

The expert garage man uses me to seal his finished work.

*

Every day I become better known. Every day those who know me speak of me as a friend for I am faithful.

Much greater will be the motorist's wonder, when he realizes that the engine will operate under adverse conditions and usually without serious complaint. Suppose we consider for a moment the lubrication of the piston and some of the conditions under which it operates.

The piston is lubricated with oil that is splashed onto the cylinder walls, the movement of the piston up and down spreads the oil the full length of the cylinder walls and upon the piston surfaces. Sufficient oil and not too much must be fed the engine or it will smoke and here rests a difficulty—it must be fed just enough, and not too much. So, if anything happens to the oiling system, whether the happening is lack of oil, poor oil, or whatever the cause, there is the immediate danger of the piston scoring the cylinder walls.

The upper half of the piston is extremely hot and unlike the cylinder wall and cylinder head, is not water cooled. The flat head of the piston is exposed to gases varying in temperatures to 3,000 deg. F. This temperature will be better appreciated if it is stated that water boils at 212 and the ordinary gas jet flame is 700 deg.

This intense heat must be conducted down through the sides of the piston, where it must jump across to the cylinder wall. Therefore, the upper part of the piston where it touches the cylinder wall must be quite hot. So hot in fact that it is marvelous that it is possible to keep any oil on the upper part of the piston at all. So here is the reason why the real lover of an automobile engine

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immediately finds out why his oil gauge has distemper, while the amateur driver tries to find out why his engine begins to resemble a boiler factory at full production.

Usually, the heavier the oil the better, so far as crankshaft and other bearings are concerned, that is, if the oil can get between the required surfaces, for greater pressure is required to push it out. It is also better for the cylinders, as it aids compression and seals up the minute spaces around the piston rings.

Oil Seepage.

If oil works past the rings in any quantity, however, the result will be fouled spark plugs, excessive oil consumption, carbon deposits between the valves and their seats and a loss of power by leakage and pre-ignition. This, however, would not be the case with heavier oils for these need longer time to burn than the duration of the firing and exhaust strokes combined.

A few manufacturers use very close fitting pistons and therefore are compelled to employ a light oil. Others allow more clearance and use a heavier grade of oil. The latter method is the best for the various reasons mentioned above. Changing to a heavier grade of lubricant will often improve compression and power in the car that has worn cylinders.

The oil must be kept cool if one wishes to obtain a large mileage per gallon. Not only does cool oil help carry away the friction heat generated in the bearings, but less is evaporated in the crankcase. It maintains more nearly its body and thickness, withstands pressure better at the bearings and more effectually seals the pistons, for, the thicker the oil the better, provided it can get between the surfaces.

No method will effectually improve cases in which oil in the crankcase is unduly heated because of leaking pistons. In finding out if this is the cause, open the breather-pipe cover instantly after a run and while the engine is working. If there is a strong smell of gasoline, or a thin smoke appears, then one or more of the pistons are leaking and this condition is fatal to the miles per gallon of the oil record, for the portion of the exploding gas getting into the crankcase sets up great evaporation and also burns and blows off the oil film around the pistons and rings. The result of course, being that more oil is used and a greatly increased wear of the pistons and cylinders due to a lack of oil.

To overcome these defects the oil must be all drawn from the engine and the engine filled with kerosene below and above the cylinders, the pistons so turned by the crank that all are about midway in the cylinders, allowing the kerosene to remain in the engine for about 24 hours. This will loosen the rings that have become gummed with oil, which is usually due to an inferior quality oil.

Gumming-up tendencies on the part of an oil may be fairly gauged by the use of an inclined plane of smooth iron or tin laid flat on a flat board. An inclination of about one to one hundred will do to start with, but it all depends upon the length of the plane, the smoothness of its surface and the temperature of the atmosphere and the oil.

Take an exact spoonful of the oil to be tested and start it running down the incline, noting the time that elapses before it ceases to run, through the action of the air congealing it. The longer this time the better the oil. Oils will congeal quickly if a mixture of animal or vegetable oil is combined with the mineral oil of which it should be entirely composed.

After the kerosene has stood in the engine for the period designated above, the engine should be cranked briskly a few times and the kerosene drained from the crankcase. Put in a fresh supply of oil and test by running; if not improved drain again, repeating the kerosene process, using a heavier grade of oil, and still a heavier grade if necessary. Run at least fifty miles to test each change fairly.

If the remedy is effected in this way, the oil level or feed will surely need adjustment, and if, in spite of the change of oil, the pistons still allow the gas to pass, the only remedy will be to have the cylinders rebored and new pistons and rings fitted. Do not attempt to waste money in fitting new rings only. If the engine has seen long service the cylinder and pistons have worn oval, not round. Yes, I know that the rings are flexible, but this to a very limited extent, and they will not conform to an oval as bad as found in that particular engine. Very often the new rings will be worse than before, as the old rings have worn so that they are more or less oval.

It will be necessary to change the engine oil whenever it has collected a certain amount of foreign matter which no strainer can keep back. The supply of oil in the crankcase of an automobile in good condition should, if of good quality, easily last 2,000 miles before it needs changing, but conditions and qualities differ so much that no set mileage can be depended upon.

The Heat Test.

A most reliable test for oil is the heat test. Half fill a clean small bottle with the oil to be tested and heat it slowly over a small gas flame until yellow vapor appears above the surface of the oil. It should then be held at this temperature for about twenty minutes and then compared with a similar bottle of unheated oil.

Inferior oil will turn quite black under this test and after standing for thirty-six hours, will reveal a deposit of black, carbon-like sediment that often denotes the presence of acid compounds, which will attack metals and the like. Good oil will only darken a little and will remain quite clear and deposit practically no sediment after standing the same length of time.

The oil strainer, which is usually a perforated or wire screen above the sump, if too large a mesh, will not keep back all the foreign matter which, of course, will be pumped to the bearings with the result already described. If the mesh is too fine the pump may not be able to force up the required amount of oil and the bearings will suffer from lack of lubrication.

Winter is practically here and vaporizing troubles will

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not be assisted in any way by the fuel that is now supplied. The cold weather in conjunction with present bad gasoline gives a condition that thins the crankcase oil, thus making it necessary to inspect the oil very frequently to prevent the engine "freezing" (the pistons expanding to the extent of stopping the engine) through lack of the proper body of lubricant.

Some manufacturers are advising weekly inspection of the oil in the crankcase, which is a justifiable recommendation, but entails, in most cases, the disagreeable task of getting under the car and removing a dirty mud pan before the crankcase oil can be reached.

Instal a Three-way Cock.

A good way to overcome this trouble and at the same time make it very easy for frequent inspections is to have a three-way oil petcock inserted in a convenient place in the oil line between the pump and the oil gauge. By turning the petcock, to open the outlet into the atmosphere, while the engine is running, enough oil can be drawn out for examination.

My engine holds about seven quarts of oil in the sump. It uses about a quart every two hundred miles. After a fresh filling I run eight hundred miles, putting in a quart whenever necessary, but at eight hundred miles I stop putting in oil, and run to 1,200. I then have five quarts of oil left in the sump. This I drain out and throw away, replacing with fresh. Thus I always have plenty of clean oil in the engine and do not grind my bearings to bits with the grit worn from them and held in the old oil.

"A waste of time and oil!" you say. Is it? Reader, have you ever looked at oil that has run 1,200 miles? Just take a test tube full of it and let it settle over night. You will find it black from carbon, steel filings and dirt. Dirt comes in through the breather pipe and the carburetor air intake.

In the selection of a suitable oil remember the oils are good, bad and indifferent. Good oil is obtained from any of the well known refiners. In every case I always get what I ask for and also make sure that the seal on the can is unbroken. Practically all good oils are now put up in sealed cans.

And it isn't all in changing oil either. I keep the valves of the engine properly adjusted and ground and thereby save on carbon cleaning. The plugs are clean and the wiring intact. I keep the radiator filled with water and the rubber connections free and open, and know that my engine never runs hot.

I see that the oil pump works perfectly and there's no guesswork in my car as to whether or not my bearings are getting lubrication. These are little points, yes, and all a little trouble. But you, readers, wanted to know where your money goes, and how to save it. I'm showing you.

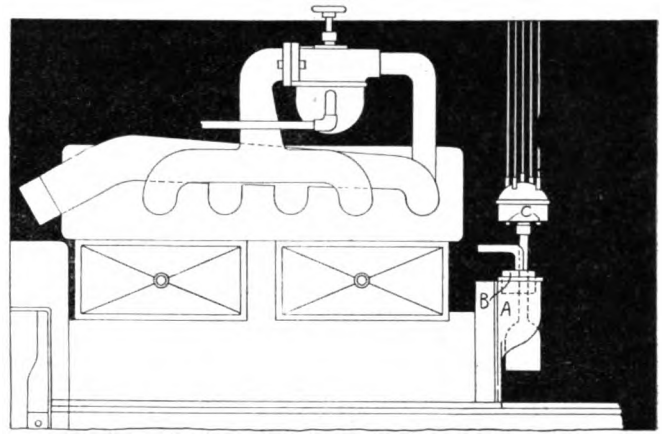
THE FORD AS A SUBMARINE.

As time passes, one is very apt to come in contact with many interesting things and be called upon to solve many perplexing problems. Everyone who has at any time had anything to do with mechanics or automobiles develops a certain power of reason and ingeniousness. Necessity is the mother of invention.

Not long ago the writer, who also answers many of the trouble department questions, received a letter from a subscriber in West Virginia. This subscriber desired to know how he could "Submarine his Ford." Now Mr. J. P. Hager (for that was his name) was in earnest when he asked the question.

In his business he is called upon to traverse roads of mud and even streams and water of some depth. At this point the writer will pause for a moment to allow the blushes of the West Virginia road commissioners to subside.

The writer pondered the question for some time and gave a few suggestions, a very few, however, for he did not see just how a flivver could be made amphibious. Mr. Hager, ordered by stern necessity, did quite a little brain work and finally solved his problem. The solu-



The Engine After Being "Submarined."

tion, in our opinion, was so ingenious that perhaps other readers will be interested.

He first installed an Atwater Kent ignition system, plugging the holes with cork and using cork or rubber gaskets where necessary. Then he plugged the breather tube with a large cork and fitted it with a small tube, which extended to the top of the engine.

The carburetor was a real problem, but he solved it finely. He removed the intake manifold and turned it bottom side up, as shown in the illustration. In this position, however, the exhaust manifold was in the way, so he procured two pieces of brass tubing (he might have used flexible metal hose) about one inch in length and clamped them between the manifold and the engine block, thus bringing the manifold away from the engine, just far enough to clear the exhaust manifold. Proper gaskets between the manifold and the tubes and between the tubes and the engine made gas-tight joints.

The carburetor he turned right side upwards and since it was above the level of the gasoline in the fuel tank he installed a Stewart vacuum feed system.

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GREASE FOR YOUR MENTAL GEAR-BOX

A little scrub with Johnson's; a little daub of paint, makes an old, worn auto, look like what it ain't.

* * *

A few tiny flakes of Dixon's, placed upon the springs, make a heavy auto, act like it had wings.

* * *

Too many chauffs spoil the bus.

* * *

A nut, tightened in time saves nine (dollars).

* * *

Fortunate John.
John was wealthy.
It was winter time.
The ground was frozen.
John bought an automobile.
The brakes did not work well.
John's wife traded the automobile.
In return she received a fine coffin.
Poor John.

* * *

Little drops of water, little grains of sand,
Put into the gas tank, make a man say "———."

* * *

Jack be nimble; Jack be quick; Jack look out for the—*traffic cop.*

* * *

Peroxide of hydrogen is a good antiseptic, a fine mouth wash and a popular hair bleach—but unless your engine needs it for one of these things, don't use it in the cylinders.

* * *

The greater the noise from the cut-out; the bigger the fool at the wheel.

* * *

Now that so many of the younger generation are good fliers, we await with interest the first reports of an airplane elopement.

* * *

What a long vacation the ex-kaiser is having!

* * *

What's cheaper than owning an automobile? Having a neighbor who owns one.

* * *

Henry owned a little auto; bright and shiny, almost new;
Took it out one rainy Sunday; raced it till it almost flew.
Tried to navigate a corner, going sixty per, I'll bet;
Left the auto in a tree top, rumor says he's going yet.

* * *

Nerve and ability work in the same direction, but nerve usually gets there first.

* * *

There is no harm in making a mistake. Every man who amounts to anything at all, makes them occasionally It is the man who does not make the same mistake twice that wins in the long run.

* * *

Get in the push—and you won't need a pull

* * *

Some people are like blotters—they absorb information, but can't make use of it.

* * *

A "one man top" is a top that requires but one man as a boss, but three men as workers to put it up.

* * *

Your face is the show-window of your soul, and your thoughts are the window trimmers. Why not have a window that people will be pleased to look at? Pleasant thoughts make pleasant faces.

* * *

A crippled body often holds a heart of gold—a dented and paintless automobile body may conceal an engine of sterling worth.

* * *

Don't kick if the boss kicks. If you're worth kicking about, you're worth keeping. Men in authority don't waste time cutting specks out of rotten apples.

* * *

"I'm fairly sure that the automobile will replace the horse," said the philosopher, "but nothing that is run by gasoline will ever replace the cow."

* * *

Money talks—isn't there a woman's face on all our coins?

* * *

The trouble with most men is that they are not equipped with a self-starter.

* * *

A man doesn't have to know much of anything, provided he knows where he can learn anything he wants to know.

* * *

The quickest way for a man to lose his friends is to drive his car with the cut-out open.

* * *

Two neighbors owned automobiles. One of them never bothered with the car's brakes—he's dead; the other enlisted and fought the hun—he's a captain.

* * *

You never miss the horses, 'till the tank runs dry

* * *

The fellow who is not permitted to knock you down with his automobile will insist that we are oppressed by too many laws.

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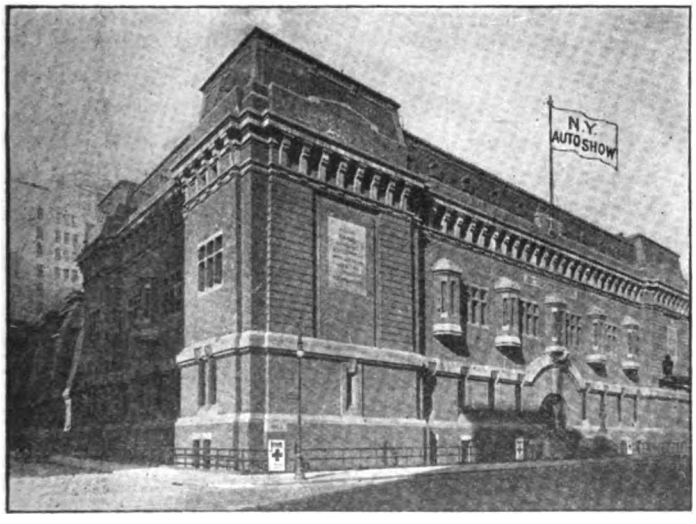
The New York Show

THE country at large hailed with delight the announcement that all restrictions had been removed against the holding of automobile shows, but the mental thermometer dropped a number of degrees when the manufacturers rendered a decision against such a display.

New York, Chicago and Boston were hard hit by the last decision, and finally the three cities took the matter into their own hands and formulated a plan whereby the Automobile Dealers' Association could back up the show. That the exhibit is desired has been proven by the great call upon the management for space. We speak of the New York show. Practically every inch of available space was contracted for before the 5th of January and the management at first were at a loss as to how such an enormous show could be staged.

It was finally decided that the show would be divided into two sections. The first would be staged during the week beginning February 1 and ending February 8. This show includes the exhibit of passenger cars and accessories. Following this show upon February 10th to February 15th, the commercial section will be exhibited. This latter section includes the exhibit of motor trucks, delivery wagons, tractors, etc.

Madison Square Garden has about 25,500 square feet of available floor space which is not sufficient to house all of the exhibits and so about 18,000 square feet in addition were obtained by including the 69th Regiment Armory. Notwithstanding this, however, the space was still inadequate, and by rearrangement of the space beneath the balcony in the Armory, room for about four more exhibits was obtained.



The Sixty-Ninth Regiment Armory.

The matter of decorations in both the Garden and the Armory is one to which considerable thought has been given. Two firms of expert interior decorators have been retained to make the setting an attractive one. The adornment of the interior of Madison Square Garden is being entrusted to M. A. Singer, and Joseph S. Petrie has designed a scheme of decorations for the Armory.



The Madison Square Garden as seen from Madison Square Park.

Madison Square Garden is to have a unique color scheme arrangement and the treatment of the balconies is somewhat ingenious. Projecting from the first balcony around the entire arena will be a roof or cornice of Spanish tiles, this cornice being two and a half feet in width and supported by brackets. The tiles will be green and an illuminating scheme will be installed beneath this narrow roof. This Spanish effect will give the first balcony a novel appearance.

The walls about the main arena floor will have alternate paneling and large mirrors which will give the effect of greater area, and the portion beneath the balcony will be illuminated with indirect lighting. The color scheme is cream and white, with certain shades of blue. The first balcony rail or parapet is paneled in artistic fashion, and a series of forty urns filled with plants and ferns rest upon it at intervals.

The pillars which rise to the girders about the Garden will be decorated in blue with white lattice work, and forty-eight old English wrought iron lanterns will hang from them, presenting a quaint appearance. Near the base of each pillar baskets of foliage—hanging vines and flowers—will be placed.

The second balcony is worked out in three shades of

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blue with white lattice work, and at either end of the Garden will hang huge blue French curtains. Above the second balcony, where the canopy covering the enormous arched roof meets the side walls, a valance of dark blue with huge scallops at intervals and conventional designs of automobile wheels, produces a neat effect. All of the visible walls of the entire building will be covered with buff material or painted in buff tints.

As the visitors enter the Garden they will pass through the lobby flanked on either side by a series of pedestals and pergolas hanging with smilax. The walls of the lobby are latticed, with mirrors alternating, and at the entrance to the arena are three large arched bowers hung with laurel roping and their bases adorned with neatly trimmed bay trees. Straight down the center of the main arena is a series of arches separating the exhibition spaces. At the top of the arches will be shown the name of the exhibitor in illuminated signs.

The exhibition hall of the Garden, which is on the right as one enters the lobby, is a huge bower of smilax which creeps up the latticed pillars and hangs from the ceiling. About the walls are flower boxes with hanging vines. The treatment of the concert hall, which is on a level with the first balcony, is a blue ceiling hanging, with blue French curtains on the walls and large flower chandeliers.

A patriotic color scheme is the keynote of the 69th Regiment Armory decorations. The rear wall of the building will have a sunburst of red, white and blue forming a huge semi-circle. Between the rows of exhibits will extend a wide arbor effect, with trellised vines and flowers. Cypress trees will form a feature of the decorations. From the balconies garlands and floral baskets will hang, and the chandeliers will be clusters of foliage, the illumination being provided by 500-watt nitrogen lamps. Illuminated glass signs will reveal the name of the exhibitor.

At the main entrance to the Armory visitors will pass through an arched arbor and around a fountain made picturesque by bay trees. The walls also will be trellised, and under the balcony there will be a pergola ceiling which will make the accessory booths attractive. The semi-circular girders of the roof will be concealed by a huge canopy of blue bunting. Outside the building at both the Lexington Avenue and 26th Street entrances will be large electric signs.

The Armory is to contain one of the most interesting passenger car body displays during the first week and commercial body exhibits during the second week. A number of the expensive passenger cars which formerly were exhibited at the Automobile Salon in the Hotel Astor will be in the Armory, and there will be some fine examples of custom bodies and rich coach work, as well as the regular stock bodies. Applications for space in either or both sections of the show may be made with the Automobile Show Committee, Hotel Woodward, Broadway and 55th Street, New York City.

THIS MAGAZINE AT THE AUTO SHOWS.

The Automobile Dealer and Repairer magazine will be represented at the New York Automobile Show in the passenger car section in the booth at space 371 and 372, located on the Balcony of the Madison Square Garden. This booth will be in the charge of Geo. A. Smith, our Eastern representative.

At the Chicago Show, Passenger Car Section, the space allotted is number 10, Coliseum Gallery. In charge of this space is our Western representative, H. F. Ludington.

We extend a cordial invitation to all our subscribers, advertisers and friends, to look up our representatives and introduce themselves. It is a good chance for us to meet each other, and cement our relations with friendship.

The Chicago Automobile Show.

The Chicago Automobile Show to be held by the Chicago Automobile Trade Association, beginning January 25, bids fair to be well patronized.

At the first allotment of space in the passenger car section of the show 137 spaces were taken by 81 applicants. In the commercial car section, 74 spaces were distributed to 34 applicants. At the time, about 30 applicants in addition were awaiting allotments. The passenger car section and accessories exhibition will be held beginning January 25 and last until February 1.

Immediately following this will be staged the commercial car section, beginning February 3 and ending February 6. Mr. Sam A. Miles, who formerly had charge of the shows for the National Automobile Chamber of Commerce, stages the present Chicago show. The decorations were planned before the War Industries Board forbade the exhibition and these decorations will be used.

Newark's Show.

THOSE who appreciate the value of the motor car in every walk of life and the people who have denied themselves the privileges of owning an automobile since the day that war was declared, will once again have the opportunity to arouse their motor interests.

With the dawn of peace came the desire to see what the motor car industry has to offer after its months of speeding up, improvements and lessons learned from meeting the demands of the Gods of War.

These desires can be satisfied in the near future in the city of Newark, where the motor car dealers are preparing for the greatest display of passenger cars, commercial cars, trucks and truck attachments and accessories that New Jersey motorists have ever inspected.

The New Jersey Automobile Exhibition Company has planned to make this a record-breaking event in every way as a fitting celebration of the return of the motor car industry to peace-time activities.

The First Regiment Armory, Sussex Avenue, will be

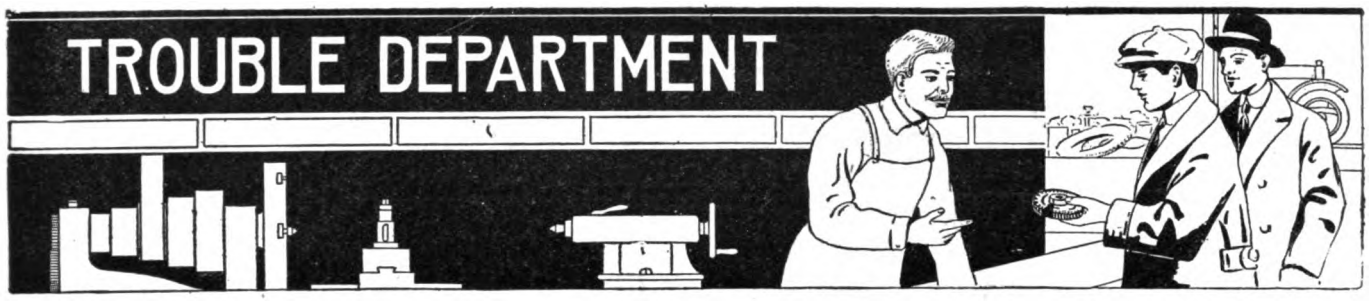
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beautifully decorated, and judging from the applications for space that have piled up on Show Manager Claude E. Holgate's desk, there will be few feet of floor space not occupied by a motor car.

Mr. Holgate announced that never in the many years that he has been associated with New Jersey motor car interests has there been such rivalry for show space among the dealers and keen interest among people who seem to be prospective buyers.

Every day telephone calls come from people in no way connected with the motor car industry, asking when the Newark show will be held. From this it is to be construed that prospective motor car buyers are awaiting the opportunity to inspect all the leading makes of cars and trucks under one roof.

If any readers are among such prospective buyers they should mark down the dates of the coming event, February 15 to 22.



Notice to Our Readers.

WHILE we try to answer all letters received, we dislike to publish certain information of a more or less personal nature, or information which is not of interest to our other readers. Names of manufacturers and addresses which only fill space in our columns, we prefer to send by personal letter, simply because we feel that the space should be devoted to correspondence of interest to the largest number of our readers. For these reasons we ask that anyone wishing information through this department shall sign his full name and address. If requested, the letter or question will not be printed in the magazine, but answered direct by mail.

Since this department is carried on for the benefit of many, we prefer to publish all interesting letters. If requested, or if in our opinion the subscriber prefers to keep his identity secret, we will use only initials or a pseudonym.

All letters are answered either directly by mail, or published in these columns. Often we adopt both methods. If you do not receive a reply within a reasonable time after writing us, send us another letter. There seems to be confusion in the mails and often letters are lost.

2581 Broken Battery Cell.

From Frank Davis, Illinois.—Will you please tell me, through the Trouble Department, what, if anything, can be done to keep two of the cells of the storage battery on my car from discharging? The third cell remains charged.

I have used the car four summers, and this is the third battery. During the life of the first two batteries (16 months each), I did not have any trouble with them.

Each time I have had the present battery charged, two of the cells have been entirely exhausted while the third cell showed a gravity reading of 1.250.

The generator seems to work just as well as ever, and the current indicator indicates "Charge" at all times when the car is being driven more than eight miles per hour.

Reply.—At first consideration we are inclined to think that the cells of your battery have been cracked and allow a slow leakage of the electrolyte. To make up for this leakage you have added distilled water, consequently the hydrometer reading has dropped steadily. A new cell is the only cure for this trouble. The battery man will be able to remove the plates from one cell and put them into a new one at comparatively low cost.

If this is the trouble, you should have noticed that the two cells in question required more water than the other. If this is not the case look elsewhere for trouble.

Very frequently the heavy connections or wire terminals drop across the cells in such a way as to short circuit them. In the same way it is possible that the battery terminals rest against the frame, the metal part of the seat, the springs in the cushion, a loose wire or in fact any metal piece. Be sure that no metal touches the battery, aside from the lead wires.

Keep the top of the battery clean and dry. Be sure that the battery is firmly anchored in position, it may jounce and hit against a metal part of the car.

Failing to find such trouble outside the battery, call the attention of the battery man to the trouble. See that the electrolyte is kept at the proper level. It is very possible that there is an internal short circuit. Only the battery expert can repair it.

Obtain an ammeter and put it in place of the present current indicator, temporarily. That is disconnect the two wires from the current indicator and connect them with the ammeter in such a way that when the lights are on and the engine quiet, the ammeter will point to the "Discharge" side. Turn off all lights and start the engine, note the ammeter reading at a car speed of ap-

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proximately 15 miles per hour and write us, giving us this information, if you do not locate the trouble. Please send us your full address.

Timing Valves Properly.

2582

From J. H. Fleege, Wisconsin.—Will you kindly tell me how to time the valves on my two cylinder opposed engine? I have removed the timing gears and though there are marks on the flywheel, I cannot seem to make the valves come right.

Reply.—Since you did not tell us the make of your engine, we cannot give you a definite valve setting, but you should have but little trouble finding the proper valve position.

The flywheel, if it is marked, may have a great number of letters upon it. First turn the flywheel over until the piston in number one cylinder (at the right when sitting upon the driver's seat) is at the extreme top of its stroke.

Examine the flywheel at this point. You may notice a mark at the extreme top, on a line with the center of the engine, or beneath an indicator, if there is one. This mark will be identified by the letters D. C. or the letter C. If there is no such mark, turn the flywheel until the piston in number two cylinder is at the top of its stroke.

When you have located this dead center mark on the flywheel, continue to turn the flywheel for about one inch until a second mark appears. This mark is lettered E. C. (probably), and indicates that the exhaust valve, in the cylinder of which the piston is near the top, should close. Put this mark beneath the pointer and then turn the camshaft in its direction of rotation (opposite to the direction you turn the crankshaft or flywheel). Place a thin piece of paper between the tappet and the valve of the cylinder you are trying to set.

Now continue to turn the camshaft in its direction of rotation until the valve has opened and nearly closed. As soon as you can pull out the paper, put the camshaft gear into place and mesh it with the crankshaft timing gear.

If there is no mark E. C. on the flywheel, you will probably find a mark, about 1¼ inches past the D. C. or C. mark which is lettered I. O. (inlet opens). Place a piece of paper between the inlet valve and tappet of the cylinder you are working upon, and turn the camshaft until the paper is gripped by the tappet against the valve stem. The gears should be meshed, the instant that the paper begins to be pinched.

If there are no marks on the flywheel which seem to give the proper setting, you can make the following experimental setting. Turn the engine over, until the piston in number one cylinder is at the top of its stroke. Make a chalk mark upon the flywheel, beneath or behind some convenient marker or identification point.

Now turn the flywheel, in its direction of rotation, until this mark is 135 degrees from its original location (135 degrees corresponds to the location of the minute hand of a clock at 22½ minutes past the hour).

At this point, set the exhaust valve in number one cylinder so that it will start to open, using the paper and meshing the camshaft gears as soon as the paper is gripped between the tappet and the valve stem.

This is only a trial setting. Turn the flywheel until the piston is again at the top of its stroke (end of exhaust) and note the point where the exhaust valve closes. The exhaust valve should not close before top center. It probably will close slightly past. If it closes before top center, remove the camshaft gear and turn the camshaft until the valve closes.

The inlet valve will open about five degrees after the exhaust has closed.

Grounded Timer Wire.

2583

From W. Stallings, Illinois.—I have a Ford car which is giving me considerable trouble. When I first purchased it, two years ago, the wrist pin bushings in the piston were not put in at right angles to the piston, consequently the piston scraped against the cylinder walls at the top and on the other side at the bottom.

It was some time before this trouble was found and eliminated. The repairman installed oversize pistons (.0025). Now this engine heats very badly and the water boils in two or three miles of running, consequently the engine then begins to pound.

Everything seems to be in good condition, the valves have been reground and the carbon removed. What can be done to prevent overheating?

There is something wrong with the ignition system, the coil for number four cylinder buzzes all of the time. I have changed coils but no matter which coil is used, that one in number four position will continue to buzz as long as the switch is on.

Reply.—Probably if you locate the ignition trouble, you will have found the cause for engine overheating. The wire which leads from number four coil to the timer is grounded, at the timer, or within the cable from the coil box to the timer. Replace all of the wiring with new if you cannot locate the trouble. Perhaps one of the headlight wires has "shorted" inside the covering and is connected with the timer wire. If the trouble is not in the wiring examine the porcelain post on the coil box. This may be connected with a metal part, possibly the battery box itself.

When you get all four cylinders running and prevent the fourth coil from buzzing all of the time, if the engine still overheats, clean the cooling system.

For this purpose, use a solution of potash lye and water, or washing soda and water. Follow the direction given in answer to question number 2572, page 61 of the December issue. If you still have trouble let us hear from you again. Tell us at what point in the piston travel the exhaust valve in number one cylinder closes.

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Installing Stewart Vacuum System.

2584

From A. L. Cleland, Ohio.—Can I successfully install a Stewart vacuum system on an automobile which has a gasoline tank located in the dash?

Reply.—You cannot install this system if at any time the gasoline level in the big tank is above the top of the vacuum tank air inlet. If you install such a vacuum system under these conditions, immediately the air inlet valve of the vacuum tank opens the gasoline will begin to siphon from the big tank and will flow from the air inlet until the level is lowered to that of the air tube.

The vacuum system is simply a device which draws out the gasoline from the supply tank and holds it in a small auxiliary tank from whence the fuel flows to the carburetor by gravity feed. We can hardly see the reason for such a system when the gasoline tank is in the dash above the carburetor level.

If, however, you can place the vacuum tank above the level of gasoline in the big tank you can make it work satisfactorily.

Transmission Gears Grind.

2585

From W. H. Swetnam, Kentucky.—I own a Willys Knight car, 1916 model, and experience considerable difficulty in changing from high to second or from second to low speeds. In making either of these changes, I am obliged to almost stop the car, to prevent the gears from grinding. The car, otherwise, seems to be all in good condition and I fail to understand the reason for this trouble.

Reply.—The trouble is not in the transmission, but in the way in which you change the gears. When you shift from high to neutral, in making the change, let in the clutch for a second and tap your foot against the accelerator, then throw out the clutch and shift to second speed. The idea is to increase the speed of the clutch shaft, to correspond with the speed of the second sliding gear.

If you will refer to the November Automobile Dealer and Repairer, you will find a page article on this same subject, written by F. L. Phillips and produced on page 47.

Batteries in Winter Storage.

2586

From S. G., Pennsylvania.—Will you kindly send me information relative to the care and charging of storage batteries which are to be put into winter storage?

Reply.—When charging storage batteries for winter storage no special attention is necessary above that ordinarily given.

Before putting the battery away for the winter, give it a long slow charge until it gases freely. The charge should be carried on at the 24-hour rate. After being sure that the battery is fully charged, it may be put in a room in which the temperature does not drop below 50°. The battery should be tested about once a month, and unless there is something the matter with it, the first charge will last until it is ready to be placed upon the car again, when it should be given another charge at the 24-hour rate.

You will probably be able to get better results if you partially discharge the battery before giving the charge in the spring.

Removing Battery Stains.

2587

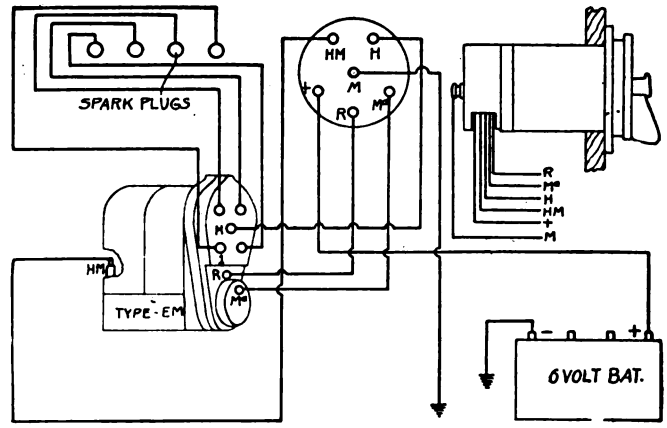
From T. N., New York.—Will you kindly inform us as to how the acid stains from a storage battery can be removed from upholstering fabric in a limousine car?

Reply.—As a matter of fact, that which you term a "stain" is not a "stain." The acid has removed the original color from the cloth, possibly has removed a portion of the fabric as well, by strong sulphuric acid action. There is no way that the apparent "stain" can be removed.

Wiring of Eisemann Magneto.

2588

From H. McFarnan, South Dakota.—Will you kindly give me a diagram showing how to wire an Eisemann magneto to a Ford engine? This magneto is type EMJ-R4 of the dual type.



Wiring Diagram of Eisemann, Type E M 4, Dual Magneto with Coil and Markings.

Reply.—We give you herewith wiring diagram of an Eisemann magneto and coil.

Difficulty in Starting.

2589

From G. R. Polzer.—Can you tell me why I cannot start my car with the hand crank? Last spring I did not have this trouble, but now the car is extremely difficult to start. It is fitted with a Dixie magneto and runs nicely after it has once been started.

Reply.—We should advise you to clean the Dixie magneto, paying particular attention to the safety spark gap. Be sure to remove all dirt and grease from the working parts and the high tension connections.

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His Engine Overheats.

2590

From F. I. Pickering, Texas.—Will you kindly answer the following questions in your Trouble Department?

(1) What is the probable cause of the water in the cooling system of a car (pump circulation) boiling while the motor is laboring on heavy pull and car speed about ten miles per hour? The car in question that does this began to act this way after it had been run about 2,000 miles; radiator not touched during that time nor carbon removed. The piston rings allow oil to slip past them into combustion chamber as shown by blue smoke of exhaust when motor is speeded up. The hood has no ventilating openings in its side and the thermometer down here in the summer time registers pretty high. My supposition first was that the radiator was clogged. I then ran lye water through it but no improvement noticed; next I used washing soda solution the same way but that don't seem to remedy it; then I removed the most of the carbon (I believe) but still it heats although I believe the carbon is the main cause. Am I right?

(2) Will one over-size tire on one of the rear wheels have any material effect on the wear of the differential? I have heard that it would. What about a tire "half-soled" or with a tread sewed on—"double-treaded?"

(3) What is the fault of the carburetor adjustment when the motor chokes up and almosts dies entirely when the throttle is suddenly opened wide?

I would like to add that I have connected up a "gas saver" by putting in a three-way connection in the lead from the dash gasoline tank to the intake manifold and running a pipe line from the third opening of the connection to the dash. At the dash I have a pet cock installed and which I open for additional air. The noise is somewhat objectionable but the most important use of this is to give the motor a dose of *hot* water, that is, when the motor is hot I take some hot water and allow the motor to draw in the hot water a little at a time through this above mentioned pet cock on the dash by means of a rubber tube, while the motor runs at a fair rate of speed. If the motor is hot and the water used likewise, the result is the entire elimination of carbon except that which has been incrusted on the piston heads for a long time—and several or frequent doses will remove this. I have tried various carbon remover solutions but like the water method best. I used the last mentioned method once only and then examined the firing chambers of each cylinder and notice that the carbon on the piston heads was soft and could be rubbed off with the fingers and the valves were as clean as though they had just been placed in the motor. It would be better to have the petcock close to the three-way connection and operated by a Bowden wire from the steering column but I could not do that on my car.

Reply.—The cause for engine overheating may be due to carbon, insufficient valve opening, retarded spark or clogged exhaust line. Your supposition regarding the carbon is probably correct.

One over-size tire, a tire half-soled or double treaded would cause but little additional wear upon the differential. This uneven wear might be stated to be about one part in ten thousand—it would be negligible.

Engine chokes up upon sudden acceleration only if the high speed nozzle is too large, permitting too great a supply of gas at high speeds—or, in other carburetors because the auxiliary air valve does not open sufficiently or easily enough to permit the entrance of more air at higher speeds.

Your suggestions relative to the pet cock are good and deserve the attention of our other readers.

A Broken Condenser.

2591

From A. A. Oesterling, Pennsylvania.—I have a 1914 model Oakland car, equipped with a Delco Junior 1914 starting, lighting and ignition system. Lately I have had trouble with the contact or breaker points. They would fuse together and corrode very rapidly. I have replaced them many times, and had them carefully adjusted by a service station man. Do you think that the points are too soft?

Reply.—We are of the opinion that the whole trouble is caused by a faulty or short-circuited condenser and would suggest that you have this unit tested by the garageman. If there is a Delco or Klaxon service station in your town, have them replace the condenser with a new one.

Attention, Readers!

2592

From C. T. Stevenson, Minnesota.—I have a King, Model D, 1916 car, fitted with a Ward-Leonard starter and generator. Is there any way that I can run this car without the storage battery?

Reply.—As a general rule, a car should not be operated without the storage battery. There is danger that the generator will be burned out. If, however, you care to go to the trouble of making the following experiment, you can use the car safely.

Open the cover above the commutator of the generator and remove the brushes from their cases, or tie the brush holders away from the commutator. Be sure that the brushes do not touch the commutator, or the machine may be damaged. This same rule works out for practically any type of generator.

Dry batteries may be used for ignition purposes while the storage battery is not on the car.

A Remedy for Piston Slap.

2593

From a Subscriber in Washington, D. C., who has written on a Bureau of Supplies and Accounts letterhead. Letter is unsigned. I have a 1918 Chandler car,

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in the engine of which there is a decided rattle. The repair man recently installed new rings at the top of each piston, but the noise still remains. The repairman tells me that it is due to piston slap.

Will you please give me a remedy for this trouble, other than the reboring of the cylinders or the renewing of the pistons?

Reply.—Under ordinary conditions, if the cylinders have not been worn excessively, a complete set of leak-proof rings will remedy the trouble. If the pistons are not fitted with a ring below the wrist pin, install such a ring, that is if there is sufficient metal in the skirt of the piston to permit the installation.

A Studebaker Car Query.

2594

Will the subscriber who signs himself F. P. kindly forward his full name and address? This subscriber asks a number of questions relative to a Studebaker 1915-1916 car and wishes the addresses of a number of manufacturers.

Piston Slap.

2595

From J. F. Indra, Iowa.—I have a Ford car which is about three years old and has been operated only about 1,000 miles. There seems to be a knock in the engine and has been for some time. Last spring I had the car overhauled, but the knock re-occurred after a short time. The connecting rods are tight and the wrist pin bushings are practically new. A number of garagemen have told me that the knock was caused by piston slap. At any rate, when a heavy oil is used, or when the spark is retarded, the knock decreases in volume. The knock is more noticeable when the car is being run on level ground.

Reply.—Since you are sure that the connecting rods and wrist pins are tight, in all probability the knock is caused by piston slap. We arrive at this conclusion because you say that the knock is less noticeable when heavy oil is used.

We should advise you to have the cylinders rebored or reground if they are round at the present time, and install oversize pistons. For this machine, the pistons should be .004 of an inch smaller in diameter than the cylinders. Be sure to fit the rings by the Prussian blue method.

2596 Removing Spring Leaves.

From R. F. Talbot, New York.—I own a model 86 Overland car which is fitted with a special roadster body. This body does not seem to be heavy enough for the present springs. Would you advise me to remove any of the spring leaves?

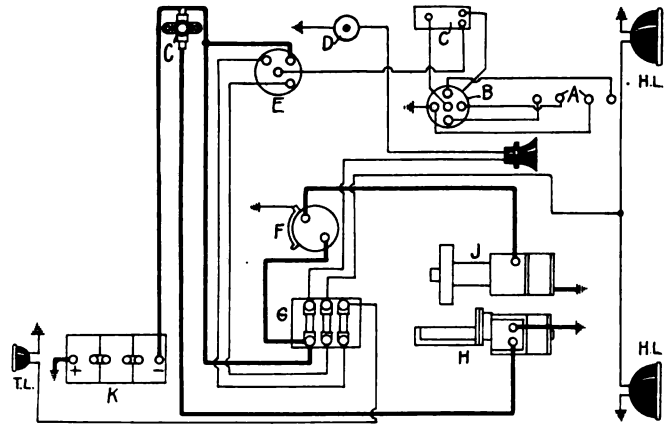
Reply.—If the springs on the car at the present time are too stiff for the weight carried, new ones of a lighter type should be put in place. If you should remove any of the spring leaves, the load will not be distributed evenly upon the remaining leaves.

An automobile spring may be compared to a stone arch bridge. So long as every stone is in place, the unit will support many tons. Remove one of the bricks or stones, however, and the whole thing will crumble. Each leaf of a spring is slightly lower than the next one above it. The thickness of the spring itself is designed and depends upon the one above it. Though it is possible that the removal of one of the leaves would not destroy the spring, still there is great danger that the spring will be weakened and snap apart.

The cheapest thing you can do, in our estimation, is to install a new spring. If, however, you decide to remove any of the leaves, remove the second from the top. If you remove more than one, remove the top one and the third one.

2597 Wiring of Saxon Car.

From A. B. Schooley, Pennsylvania.—Will you kindly give me a wiring diagram of the Saxon car, 1916 model? Will you also show in the diagram where an ammeter can be attached? The generator does not seem to keep the storage battery charged, although I have had both



Wiring Diagram of Saxon 1916-17 Four Cylinder Car. A, Spark Plugs; B, Timer-Distributor; C, Coil; D, Horn Button; E, Ignition and Lighting Switch; F, Cut-Out; C, Fuses; H, Starting Motor; J, Generator; K, Battery.

units overhauled and they are supposed to be in good condition. Is it possible for me to adjust the generator so that it will give more current? Is it possible for me to run the car without the storage battery?

Reply.—We give you herewith a diagram of the Saxon 1916, four-cylinder car. This machine was fitted with a Wagner generator and Detroit starter. The ammeter connection is shown.

Be sure to insert it in the line at the exact point shown in the sketch. There is no way that you can change the charging rate of your generator. This unit should keep the battery charged at all times if the wiring is correct.

However, about every six months the battery should be charged at a charging station. There is no way that you can operate the generator with the storage battery disconnected, without taking a chance at ruining the

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unit. If you are having trouble with the generator, that is, if it does not seem to furnish enough current, perhaps the wiring is at fault. In any event, we should advise you to rewire it, being careful to use the same sized wire as originally used throughout the machine. If the ammeter indicates a charge of four amperes or over, the amount of current passing into the battery is sufficient, otherwise return the generator to the service station for repairs.

If the ammeter indicates charge when the engine is stopped and the lights are on, reverse the connections. It will then register correctly.

Spark Intensifiers.

2598

From George Cary, Mississippi.—I would like to tell the readers of my experience with spark intensifiers. I have an engine in which the two front spark plugs carbonized very rapidly. This fact bothered me a great deal, until I installed two spark intensifiers, one at each plug. Now the plugs remain clean at all times.

Reply.—There is one little point about spark intensifiers which we can suggest to you. You may find trouble in starting the car while these are being used, but you can obviate this difficulty by "shorting out" the intensifiers. As soon as the car is started remove the short circuiting wire and the car will run smoothly with the intensifiers.

A Tractor Question.

2599

From Frank Johanneck, Minnesota.—The cylinders in my 30-60 tractor are worn about 1/16th of an inch out of round, and I would like to make them last until another fall without reboring them, if possible. Would you suggest that I place all of the piston ring joints at the bottom of the pistons? The cylinders are horizontal and it is my idea that if the joints are all placed at the bottom since the ring hugs the lower portion of the cylinders, these joints will not be at the point where leakage is greatest.

Reply.—We would not advise you to place all of the piston ring joints at the bottom of the cylinders as you suggest, for the reason that there will surely be considerable gas leakage through them. We would advise you to adopt the following method if you do not want to have the cylinders rebored:

Space the joints in about quarters around the piston, that is, the top ring joint is at a certain point, the next joint to it is the second ring, will be about one-quarter of the circumference; the third ring joint will be about one-quarter of the circumference away from the second, and the fourth one, one-quarter away from the third. After they have been located, drill a 1/8 inch hole in the piston so that one-half of the hole is in the ring, and the other half in the corner of the piston groove.

Drill this 1/8 inch hole so that it comes just to the bottom of the piston ring, then drill a 3/32 inch hole, using the same center through the piston, and drive into this second hole a small pin, riveting it over so that it cannot slip out. Cut the pin off so that the end is just below the surface of the piston.

Do this for each ring, then fit each ring to the cylinders. Use a new ring in each case and scrape it in by the Prussian blue method, being careful to scrape it into the position in which it will be located after the piston is in place. This is the only way that you can fit the rings and get satisfaction.

Charging Battery from Ford Magneto.

2600

From J. E. A., Canada.—Will you kindly tell me if there is any way that I can charge a storage battery from a Ford magneto, and if there is, send me a wiring diagram?

Reply.—It is impossible for you to charge your storage battery from the Ford magneto by any practical method. The Ford magneto generates alternating current, and should you connect your battery with it, you would ruin both the battery and the magneto within a few minutes. A storage battery must be charged from a direct current line. The amperage used should be about 4. The voltage matters but little. It must, however, be direct current.

A Click in the Oil Pump.

2601

From Otto Dieter, Missouri.—I have a Regal Model E light 4 car in which there is a peculiar click. I am fairly sure that this click is located in the oil pump and think that it is caused by the small steel balls which act as check valves. I removed these balls and replaced them with balls made of fiber. This change seemed to eliminate the click partially, but not wholly. What do you think may be the cause of this, and how may I remedy the trouble?

Reply.—We doubt very much if the click is caused entirely by the two ball check valves, but are inclined to think that the plunger does not fit the housing properly, or that the end of the plunger is worn. Remove the pump and examine this unit. If there is a spring in it which returns the plunger to its proper place, replace the spring with a new one.

There are a number of other possibilities for trouble. First, it is possible that the pump is not fastened tightly to the crankcase. Again, it is possible that the plunger fits the housing too tightly, or binds at a certain point. In this event, it would not follow the cam as the cam revolved, but would snap against the cam every revolution.

If you still have trouble let us hear from you again, and we will advise you relative to altering the check valve arrangement. We do not want to do this until you tell us whether or not the device is furnishing sufficient oil.

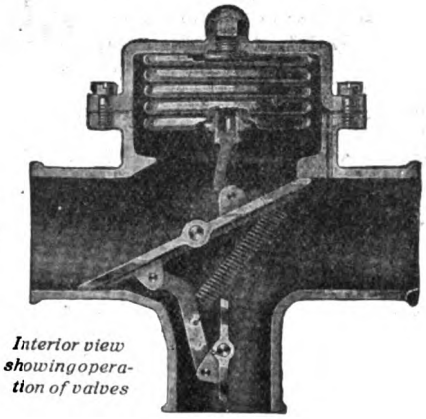
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Rayfield Resumes Production

Our war work is now almost finished. Shipments of Rayfield Carburetors are increasing daily. Soon we will be up to schedule on the world's most efficient carburetors for passenger cars and trucks.

Warm up your motor quicker

Rayfield Motor Thermostat



Interior view showing operation of valves

Every motorist has experienced the difficulties of winter driving. When the motor is cold it will continue to miss. It will not accelerate. It has no power.

The installation of a Rayfield Motor Thermostat causes the motor to heat up quickly, and maintains a constant efficient temperature at all times. If the car is stopped, the engine remains warm for a greater length of time. This greatly facilitates starting and gives a quicker acting motor. In fact, it assures the same motor efficiency in winter as in summer.

The Rayfield Motor Thermostat is different in operation and construction from any other device of its kind. When water in motor is cold the main valve is closed, which prevents circulation through motor block. This permits motor temperature to rise to the point of maximum efficiency within a very few minutes in the coldest weather.

In motors with pump circulation the pump pressure is relieved by by-passing the water from delivery end of pump through by-pass valve and into the radiator. Complete circulation of water through the radiator is thus maintained at all times. This overcomes, to a great extent, the common difficulty of water in the radiator freezing before circulation begins.

When water in motor block reaches a temperature of 170 degrees, its action upon diaphragm of the Thermostat causes it to expand and gradually open the main valve. This action also slowly closes the valve of the by-pass connection. The diaphragm is sensitive to any variation of water temperature and will open or close main valve as required. In this manner a constant, efficient motor temperature is maintained.

For thermosyphon systems the price, including all fittings, is $15.00. For pump circulation systems the price, including all fittings, is $17.50. Installation is simple. Your own garage, or dealer, can handle it for you.

Sales and Service Stations Everywhere

Findeisen & Kropf Mfg. Co.

21st and Rockwell Sts. CHICAGO

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NEW AND INTERESTING THINGS IN MOTORDOM

Main Bearing Aligning Reamers.

Automobile manufacturers have been able, since the advent of the Martell Reamer, to save much time and labor—and consequently money—in reaming all the main engine bearings and eliminating "Hand Scraping" simultaneously. Now it is possible for the repair man and machine shop to derive the same benefits by the use of the Martell Aligning type Reamer, which accomplishes these three essentials of a satisfactory job:

(1) Perfect alignment through all bearings.
(2) Correct position of shaft in relation to other shafts or parts dependent upon it for motion.
(3) Correct size of bore of bearing, allowing for oil clearance.

Moreover, all of these results are easily accomplished at a saving over hand scraping of from 50% to 90%.

The Reamer Set consists primarily of one shaft with one or more Reamer Heads and a number of supporting bushings used to properly center the bar before the reaming operation is begun. These supporting bushings each consist of two eccentric sleeves held in a conical sleeve, the conical portion of which is provided with a fine pitch thread.

The complete supporting bushings are screwed securely into the soft metal of the bearings to be reamed, and the eccentric sleeves adjusted until the reamer bar is in the desired position and perfectly aligned through all bearings.

Lock screws and bolts are provided for properly maintaining the correct setting.

A zero mark on the faces of the eccentric sleeve flanges shows the central or concentric position of the eccentric sleeves. The drawing shows these features in detail.

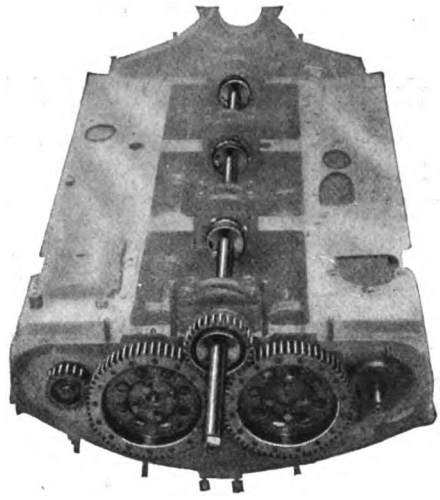
The Reamers, as will be noted, are of the inserted blade type, the blades being expanded by means of cams or wedges, and a front and rear adjusting nut.

The ends of the blades are ground accurately to the same angle as that of the adjusting nuts, and as all actuating parts are carefully hardened and ground, extreme accuracy of adjustment is obtained.

Owing to the construction of the supports for the reamer bar, no strains are imposed on the crank case, nor is there a tendency to distort it, since these supports are secured to the bore of the bearings and have no attachments to any other part of the crank case.

The tapered portions of the supporting bushings, screwed firmly into the ends of the bearings, tend to seat the bearings securely into the case and cap. A very desirable feature.

This equipment will produce bearings that are exactly in line. Furthermore, it is claimed that the bearings will show a greater area in contact with the shaft than those scraped by hand because the supporting bushings, acting as guides, compel the reamer to revolve in a true circle.



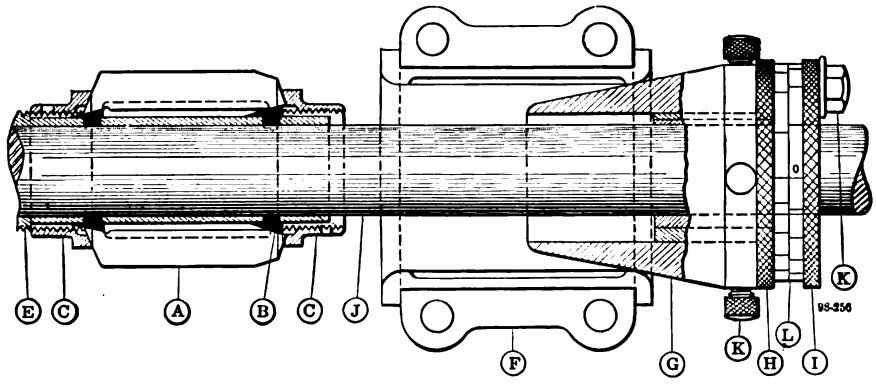
A Martell Aligning Reamer, Showing the Crankshaft Gear Mounted on a Special Bushing on the Reamer Bar, to Secure Proper Gear Mesh.

The superiority of this method to hand scraping is apparent when it is considered that perfectly aligned bearings will give more satisfactory service for a long period than hand-scraped bearings, for since the alignment is perfect there is no tendency for the crank shaft and bearings to work against each other. The shaft, of course, must be straight. The point has often been brought up that if a crankshaft is not straight the bearings should not be in line by an equal amount in order to accommodate the error. Suppose a crankshaft line of bearings is reamed out of line .002 to allow for the same error in a crankshaft. When the shaft is revolved 180° the error is not reduced but is really doubled. It, therefore, is apparent that perfectly aligned bearings give the least strain in all directions.

Crankshafts, therefore, should be straightened. The most important point is that the high cost of hand fitting may be eliminated almost entirely. It is also a proven fact that perfectly aligned bearings have the very beneficial effect of reducing vibration.

The whole construction of this device is very simple, the design and accuracy of workmanship being responsible for its great efficiency.

These equipments are made in two sets, No. 1 covering 3 or 5 Bearing Motors and No. 2 covering 4 or 7 Bearing Motors. Blades for diameters of 1¾ inches to 2⅜ inches are carried in stock and one reamer of any one size will be furnished with either No. 1 or No. 2 sets. Additional blades for different diameters can be purchased at a nominal price.



Cross Section of a Martell Aligning Reamer. A—Reamer Blades; B—Adjusting Wedges; C—Adjusting Nut; E—Reamer Head; F—Bearing To Be Reamed; G—Conical Sleeve; H—Outer Eccentric Bushing; I—Inner Eccentric Bushing; J—Reamer Bar; K—Lock Screws; L—Graduations. One Supporting Bushing and Reamer in Partial Section. The Shaft is Shown to One Side of the Bearing in Order to Illustrate the Extreme Off Center Position of the Shaft When the Eccentric Bushings Are Moved to Their Full Throw.

Luverne Truck Parts.

We know from actual experience that there are thousands of shops throughout the United States who have the necessary equipment and help to enable them to build motor trucks and to convert passenger cars into motor trucks for the trade in their local territory on a basis which will furnish their customers with the maximum of truck value and service, and at prices which will easily meet outside competition and enable the concern to become an actual motor truck factory with a permanent and profitable future.

To operate successfully and on a small investment it is necessary that these local truck factories have access to a supply of truck parts which they can get promptly and in small quantities as needed, and the Luverne line of truck and truck unit parts is offered to the trade to meet this demand.

The Luverne line of truck parts are furnished in several sizes suitable for trucks and truck units of from three-quarters to three ton capacity, and consist of axles, wheels and tires, frames, fittings, springs, motors, transmissions, bodies, cabs, hoists, etc.

All parts are complete in themselves, ready to assemble and are sold either in complete sets or as separate units.

The Luverne line of parts is also well adapted for the export trade, for foreign firms who are in position to assemble the parts, and build bodies and equipment locally.

Dwyer Bevel Glass Back Curtain.

One of the simplest ways of adding distinction to the standard Ford equipment is provided by C. Marville Dwyer, 114 West Washington, Los Angeles, who is manufacturing and marketing the Ford Bevel Glass Back Curtain.

The Dwyer curtain is three thicknesses of standard Ford curtain material, corresponding in appearance with the balance

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$3.00 per set of 3

Rockies West $3.25
Canadian Price $4.50

It's easy to tell the Genuine by the Red and Black Package

Over 500,000 Ford owners are using Cork Insert

A year and a half ago we told you what Cork Insert *Would Do*—today we tell you what it actually *Is Doing* for over half a million Ford owners.

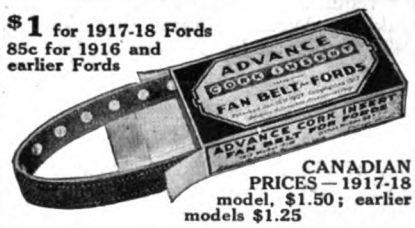
For over 500,000 users, Cork Insert Transmission Lining is giving smoother starting and stopping cars. It has eliminated chatter. It has made the brakes SURE. It has stopped the racking vibration of stopping. On top of all this, it is giving wear several times as long as that of ordinary linings, and saving the cost of frequent replacements.

The secret of the phenomenal success of Cork Insert is the successful combination of cork with cotton fabric. Buttons of cork are set into highest grade fabric. The corks provide *sure* friction. The lining provides the strength to hold the car and protects the corks. *The combination* makes the finest working, longest lasting lining ever produced.

Every Accessory dealer and garageman handles Cork Insert or can get it within a very few hours — for EVERY JOBBER CARRIES IT IN STOCK.

Advance Automobile Accessories Corporation
Dept. A5, 56 East Randolph Street ∴ CHICAGO

$1 for 1917-18 Fords
85c for 1916 and earlier Fords



CANADIAN PRICES—1917-18 model, $1.50; earlier models $1.25

Cork Insert Fan Belt for Fords

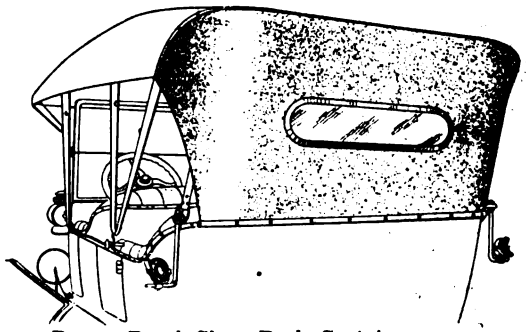
Retards overheating by keeping the fan fanning. Most motor trouble is caused from overheating. This is due in no little degree to loss of driving power—estimated as high as 25% to 50%—because ordinary fan belts slip and stretch. Cork Insert Fan Belts stop the slipping. It doesn't have to be run tight to prevent slipping, like ordinary belts. This, plus its durable construction, means extra long wear and economy. Cork Insert Fan Belts outlast all others—hence economical.

CORK INSERT
TRANSMISSION LINING FOR FORDS

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of the trim, fitted with a 6 x 26 heavy bevel glass window in place of the ordinary celluloid. The width of the glass used gives a much wider view behind to the driver as well as greatly enhancing the appearance of the car.

There is also furnished by this concern a full Ford top material recover outfit including roof, quarters, back curtain, tacks and binding, all ready to slip over. The special rear curtain is not alone for Ford



Dwyer Bevel Glass Back Curtain.

cars but is furnished in any size and any weight and kind of goods to fit various cars.

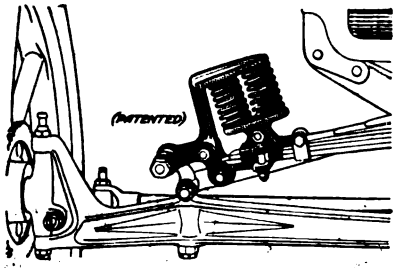
New Prices on Kerosene Engines.

Those who are thinking of buying a farm engine will be interested in latest prices on the Witte—the better quality engine—longest on the market, easiest to use, fuel-saving, reliable. As usual the Witte factory offers the most favorable prices to the customer, and now as before the war, and during the war, buyers can buy on practically their own terms. Every Witte Engine—gasoline or kerosene—is sold on a valid five-year guarantee backed by the largest exclusive engine factory in the world selling direct to user. A handsome new engine catalog, and big illustrated folder, showing what Witte users are doing, together with latest prices, mailed free on request to Witte Engine Works, 2492 Oakland Avenue, Kansas City, Mo., or to 2492 Empire Bldg., Pittsburgh, Pa.

Champion Shock Absorbers.

The Champion Shock Absorber Sales Co., of 918 North Senate Avenue, Indianapolis, Ind., manufacture a shock absorber of considerable merit. This device is designed primarily for Ford cars and consists of a unique lever combination of coil springs, and castings.

To the axle housing is attached an inverted L shaped casting and hanging upon the lower end of this casting upon a mov-



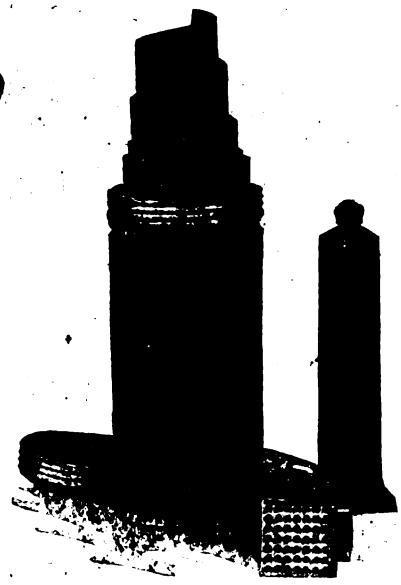
A Champion Shock Absorber.

able pivot is the car spring. The L shaped casting itself is free to swing vertically.

Between the L shaped casting and the spring are mounted two heavy coil springs. One can see, therefore, that two systems of levers are used, which tend to reduce the vertical body movement and to convert it to sidereal motion. The springs tend to absorb shocks and rebound. The shock absorbers are easy to apply and require no change in spring or car design.

Mills Patch.

The Supreme Self-Vulcanizing Patch for auto tires, motorcycle tires, rubber



The Mills Patch.

boots, hot water bottles, or anything rubber will patch. Mills Patch meets the requirements of all climatic conditions. Its sticking qualities are not affected by heat or cold. Mills Patch Self-Vulcanizing outfit consists of a sheet of pure Para rubber, a tube of their own rubber cement and a buffer. If your dealer cannot supply you they will send same postpaid on receipt of price. Address: Auto Parts Co., 4102 Olive Street, St. Louis, Mo.

The Otter Individual Container Line.

The Otter Mfg. Co., 243 West 17th Street, New York City, have just issued their catalog for 1919, covering full lines of ignition parts and starter and generator brushes for popular systems.

This catalog forms a complete handbook and directory to ignition and starter and generator work, since it carries lists of all cars built during recent years, with a statement of the ignition system in use and the starting and generating systems applied to such cars.

The Otter line of ignition parts is unique in that each part is packed in a rust-proof envelope, carrying on the outside a description of the part with a list of the popular cars upon which the system is used.

Each starter and generator brush or set of brushes is packed in an individual carton, carrying a full description of the brush and its location in the system, together with a statement of the popular cars upon which that system is in use. This feature of the individual packing is of great aid to the dealer, to the repair man and to the user, and while it means much to the handler of the parts, no extra charge is made for this method of packing.

Another feature of this line which attracts attention and tends to systematize the business is the arranging of compact assortments of ignition parts and of brushes, thus giving at a low price complete assortment for general use or for individual cars. The completeness and compactness of this method of handling the goods makes an appeal to every supply house and car agent.

The spring assortments containing full lines of compression and extension springs are popular with the trade, giving unusual value for the money.

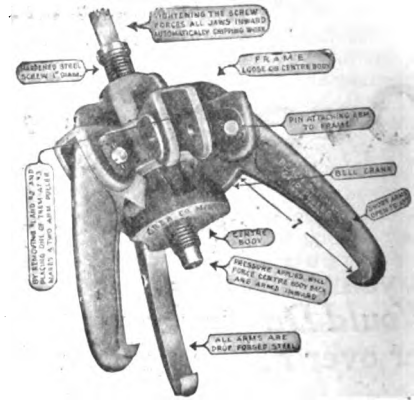
The line of electrical cables is complete, being especially selected with a view to automobile work.

In the foregoing it will be seen that the line covers practically the entire electrical equipment of the automobile, outside of generators, distributors, batteries and lights.

Beach Automatic Grip Puller.

A good wheel or gear puller is as indispensable in the garage as a hammer. It may be used in a great many ways. It is practically the only tool with which a flywheel may be removed without the attendant danger of breaking the crankshaft.

The Beach Automatic Grip Puller, here illustrated, is built mechanically right, and when once the jaws are closed on the work and the screw is set against the shaft, it is impossible for them to unhook. Tightening the screw forces the jaws inward, automatically gripping the work, throwing pressure toward shaft or axle, making it more positive and requiring less pressure than the ordinary puller.



The Beach Automatic Grip Puller.

Positively removes wheels, gears, flanges, couplings, universal joints, wrist pins, and any number of other things. Quick, strong, durable, efficient and simple. It is complete with two sets of jaws; three 7½ inch jaws (open to 10 inches), and three 12 inch jaws (open to 18 inches).

Either a two or three jaw combination may be used as there is an extra jaw socket directly opposite one of the other jaws. It is also made with a locking device by which the jaws may be set and locked in any position, which makes it a one-man puller.

This device is manufactured and sold by The Greb Co., of 219 State Street, Boston, Mass., who make a special discount to jobbers, dealers and garages.

Knowlson's Spring Leaf Spreader.

Not long ago we published in our magazine an article relative to the lubrication of automobile springs. The writer of this article claimed that by lubrication the riding qualities could be increased 200 to 300 per cent. As a matter of fact, some man-

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THE hardest job of "clean-up" is made easy by the use of Goblin Soap.

Here's a soap that is mild and effective, it acts quickly and thoroughly, removing the dirt with its soft, creamy lather, which rinses off easily leaving the skin soft and healthy.

Goblin Soap contains vegetable oils which make it wholesome to the skin—it lathers freely in even the coldest water.

Use it in your home for toilet or bath—for kitchen or garage. Fine for the office or the workshop.

If your dealer does not have Goblin Soap, please send us his name and we will see that you are promptly supplied.

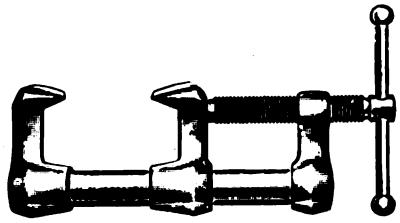
CUDAHY, 111 West Monroe Street, Chicago
64 Macauley Avenue, Toronto, Canada



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ufacturers guarantee springs for the life of the car if they are kept lubricated properly.

Springs are made of tempered steel, and the leaves cannot be spread apart safely by the old hammer and cold chisel method. They should be pried apart slowly by a special tool called a Spring Leaf Spreader.



Knowlson's Spring Leaf Spreaders

Such a device is manufactured by the Spring Leaf Lubricator Co., Ann Arbor, Mich.

This device consists of a stationary wedged shaped jaw mounted on a heavy casting. Sliding upon this same casting is a second wedged shaped jaw operated through a large set screw.

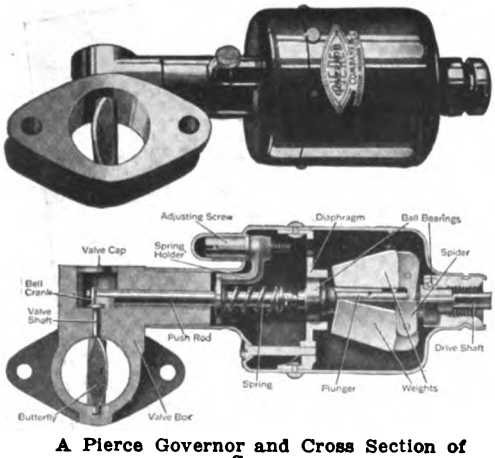
In operation the two wedged shaped jaws are placed against the edge of the spring leaves and the set screw turned. This forces apart the leaves and permits the insertion of grease or oil.

The same manufacturers market another style of spring leaf spreader which consists simply of a large drop forged casting and a set screw upon the end of which is mounted the second wedge of a pair, the other wedge being mounted upon the body of the tool. This device operates practically the same as the one described above.

The Pierce Governor.

No matter how well you can trust your chauffeur or your truck driver, you can never be sure that he will not forget himself and race your car or your truck at a higher speed than he should.

In the case of your family chauffeur, there is danger in excessive speeding and you may lose one or all of your family. In the case of your truck, the driver is increasing the upkeep and repairs by many per cent., when he runs the truck at a speed greater than it was intended. It is within your power to prevent such over-



A Pierce Governor and Cross Section of Same.

speeding and you can do so by insisting that the manufacturers of your car or truck install a Pierce Governor, sold by the Pierce Governor Co., of Anderson, Ind.

This device operates upon the centrifugal principle, and controls a butterfly valve located in the intake valve between the carburetor and the engine. It cannot be tampered with without the knowledge of the owner. The owner, however, can set it so that it will prevent the car from going above a certain speed.

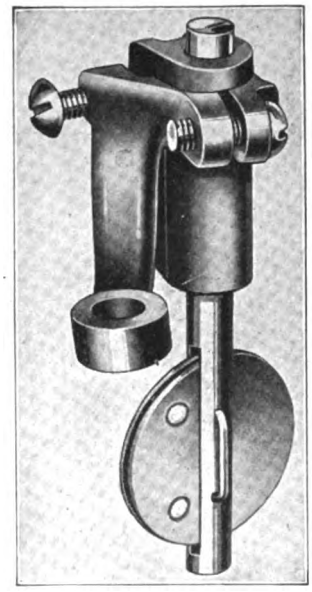
Since the device is governed entirely by the speed of the car, it does not detract from the engine's power at low speeds, while the car is climbing hills, or running through sand and mud. When you purchase your next car or truck, insist that it be equipped with such a governor.

Apex Carburetor Throttle.

The Apex Carburetor Throttle, a novel device, is being put on the market by the Apex Electric Mfg. Co., 1410-12 West 59th Street, Chicago, Ill. This device bids fair to meet with the approval of many automobilists, for it embodies a new principle in carburetion.

The manufacturers have designed this throttle to replace the ordinary butterfly throttle in the Holly or Kingston carburetors used on Ford cars. The device consists of a hollow throttle control lever and a split butterfly valve as shown in the accompanying illustration. When the throttle is nearly closed for starting, no air is admitted through this device.

After the engine is started, however, and the throttle partially open, air is automatically permitted to enter at the top of the carburetor control shaft. This air travels down through the shaft to the split valve and is carried with the mixture into the engine. One can see that a rich mixture can be had for starting, while for high speeds the mixture is automatically made leaner.



The Apex Carburetor Throttle.

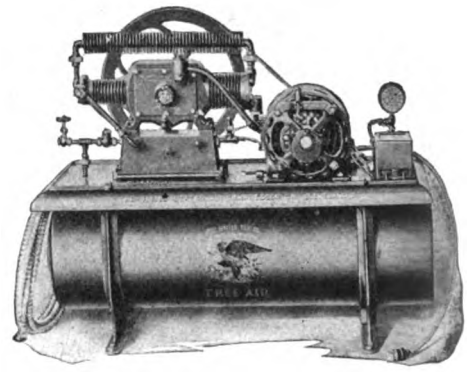
The manufacturers claim that the gasoline is vaporized much better, that the engine will not backfire or load up, and that higher gasoline mileage can be obtained.

The Design and Completion of United States Two Stage Air Compressor.

The United States Air Compressor Co. of Cleveland, Ohio, manufacture a complete line of Air Compressors in both the Two Stage and Single Stage types, comprising twenty different units. These units vary in capacity from 1½ cubic feet to 21 cubic feet per minute, and are capable of maintaining pressure up to 500 pounds.

The manufacturers claim the Two Stage principle produces compressors with far greater efficiency than any other design.

Although the Two Stage Power Driven Air Compressor existed long before the



United States Two Stage Air Compressor.

Single Cylinder (Single Stage) Hand Pump, the experience of millions of automobile drivers is cited as evidence that the Two Stage principle is superior to that of the Single Stage.

It is well known that whereas Single Cylinder Hand Pumps were in general use a few years ago, it is a very rare sight to see one now. This remarkable evolution is claimed to have been brought about by the superior construction of the Two Cylinder (Two Stage) Hand Pump. It has been pointed out by the manufacturers that in the design of their Air Compressors, one weakness of the Two Stage Hand Pump has been completely eliminated; furthermore, their machine is improved in fourteen important points.

The operation of their United Two Stage Air Compressor is explained in their literature as follows:

"One of the principal efforts of machinery designers is in the direction of eliminating resistance. The greater the resistance in any machine the lower the efficiency.

"An Air Compressor continually operates against resistance and the unprecedented success of the United States *Two Stage* Compressor has been due to the fact that resistance has been reduced to the very minimum with a relative increase in general efficiency.

"An air compressor must overcome the tank resistance at each impulse or its efforts are of no avail. A single cylinder (single stage) compressor takes air in at atmospheric pressure and forces it direct into the tank. The greater the diameter of the piston the greater the resistance to be overcome and the greater the possibility for piston leakage.

"Now contrast this with the operation of the United States *Two Stage* Compressor: As the piston in *low pressure cylinder* moves to the left it takes air in at atmospheric pressure. On its return this air is forced through Inter Cooler into *high pressure cylinder*, being raised to 40 pounds pressure, the *first stage*. This piston now 'steps up' the air again to a very high pressure twice; a small diameter piston instead of a large one works against the tank pressure; two power impulses instead of one are attained at each revolution; the crank is balanced between two bodies of air which gives a cushioning effect, reducing the noise and vibration to a minimum."

A catalogue describing the complete line

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National Thrift—and the Tire Shortage

LAST YEAR—1918—was the greatest in the history of tire accessories. War necessities enforced economy—taught motorists to save tires.

TRADE MARK

This year—1919—will bring even greater sales. Increased car production and depleted tire stocks will prolong the present tire shortage. These conditions—and the national thrift habit of using accessories—treating tires better—require a good stock of accessories NOW.

Goodrich "Standardized" Accessories offer Better Quality with Better Finish at a Better Price to You. Every unnecessary expense eliminated—even packing charges and shelf space saved by our new cartons.

Stock NOW—for 1919

The B. F. Goodrich Rubber Company

The City of Goodrich—Akron, Ohio



GOODRICH

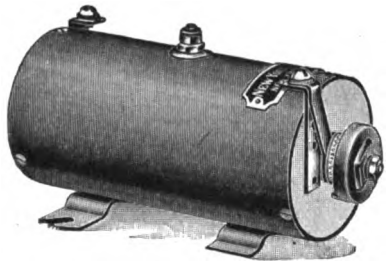
ACCESSORIES

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of United States Air Compressors will be sent to anyone who writes the United States Air Compressor Co., Carnegie Avenue, Cleveland, Ohio.

New York Replacement Coils.

Our subscribers frequently write us relative to battery systems, coils and parts. They are not always able to purchase coils direct from the manufacturer. Such subscribers should write to the New York Coil Co., 338 Pearl Street, New York City,



A New York Replacement Coil.

and obtain their catalogue of replacement coils and resistance units for Remy and Delco coils.

This company manufactures a very complete line of high tension coils which can be used in place of practically any coils used in standard equipment.

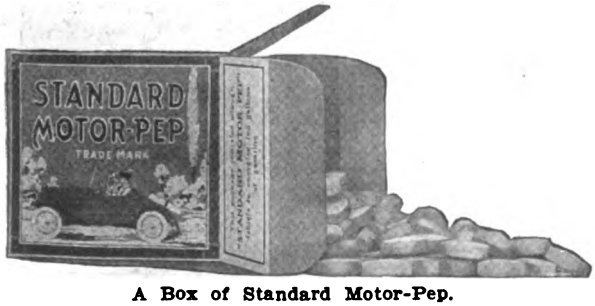
Standard Motor Pep.

Automobile owners in all parts of the country complain of the gasoline which they are obtaining at the present time. The more volatile elements of this fuel seem to be lacking, while the lower test products comprise a large proportion of the fuel.

The objections to this gasoline are first, that a large portion of it will not vaporize rapidly, consequently an engine is difficult to start; second, the liquid carbonizes in the cylinders; and third, the fuel finds its way into the crankcase, and dilutes the lubricant.

All three troubles are caused directly by the fact that the fuel does not burn rapidly enough for the engine. Manufacturers have devoted considerable study to the problem and the Utilities Co., 310 Citizens Building, Cleveland, Ohio, have offered a solution in the shape of a fuel energizer called Standard Motor Pep. This product is guaranteed by the manufacturers to give 20 per cent. more power; to eliminate carbon, and to increase the mileage obtainable by one-eighth.

The fuel is in the shape of tablets and the manufacturers back the product by strong guarantees. They claim to return the money if the tablets do not give the results they claim. A small trial package may be obtained at a very low cost. We should advise our readers to make a trial of it.



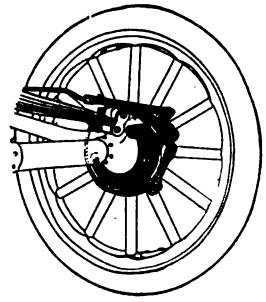
A Box of Standard Motor-Pep.

Pla-Safe Emergency Brakes.

Every Ford owner realizes that the Ford emergency brake is incomplete and it does not answer the purpose after the shoes become slightly worn. There is constant expanding action while the emergency brake is being applied which has a tendency to bulge the brake drum to a slight extent.

Add to this the normal wear of the drum and the shoe, and the life of the brake is but short. An external contracting brake, to a certain extent, prevents the bulging of the brake drum and gives an additional braking surface. When the external and internal brakes are locked, the brake drum is held stationary.

Such an external contracting brake is being marketed by the Pla-Safe Co., of Brookville, Pa. This brake is constructed along modern mechanical lines. It can be applied to any Ford car with very little work. There are no holes to drill in the housings, since the castings are held in place by the regular Ford bolts. The Pla-



A Pla-Safe Emergency Brake Applied.

Safe Emergency Brake, as it is termed, is lined with the best lining on the market, and when once applied, brings the Ford braking system up-to-date.

Ideal Hose Clamps.

Every car owner knows how much trouble may be caused by neglect of the automobile cooling system. He knows what an unsightly appearance a water leak gives the radiator or the mudguards, and so he should endeavor to keep the cooling system water tight.

He cannot do this unless the hose fittings are tightly clamped to the castings. A hose clamp which is easily applied and makes an absolutely tight joint is called the Ideal Hose Clamp, and has one outstanding feature which deserves mention. It is so designed that it exerts an even pressure the full circumference of the water hose.

It does not have a dead spot at the bolt side. This feature not only prevents leakage, but prevents the pinching and buckling of the hose. Our readers desiring to obtain this clamp should write to the Ideal Clamp Mfg. Co. 200-202 Bradford Street, Brooklyn, N. Y.



An Ideal Hose Clamp.

U-Fit-It Storm Door Frame.

The Midway Mechanical Co., 1555 Selby Avenue, St. Paul, Minn., are marketing a device which is applicable to Ford cars driven during the winter time. This device is called the U-Fit-It Storm Door



U-Fit-It Storm Door Frame in Use.

Frame, and is capable of making the front curtain open like a door, so giving the occupants a chance to get out of the car without rumpling the curtain.

It consists primarily of a frame designed to fit the front compartment between the windshield and the center curtain of the car. This frame can be fitted very readily to the regular Ford curtain and held in place by rivets and bolts.

The illustration gives one an idea as to how a Ford curtain can be swung when the device is in use. This saves the chances of celluloid window breakage and rumpled curtains. It can be applied to either side of the car.

Endura Sheet Packing.

Though few motorists realize the fact, 50 per cent. of motor troubles are due to gas or liquid leakage. Let us explain. From the front of the engine to the rear of the differential, every mechanical joint in the housing must be tight or money is lost.

In the engine an open joint may mean oil leakage or gasoline leakage. If the joint is open in the base, the oil will be lost, and there is chance for extensive damage. If the manifold joints are not tight, the engine will not develop its maximum power. Cylinder oil or transmission grease cost too much money to be thrown away upon the road.

The autoist should insist that his garageman in making repairs pay particular attention to the packing used.

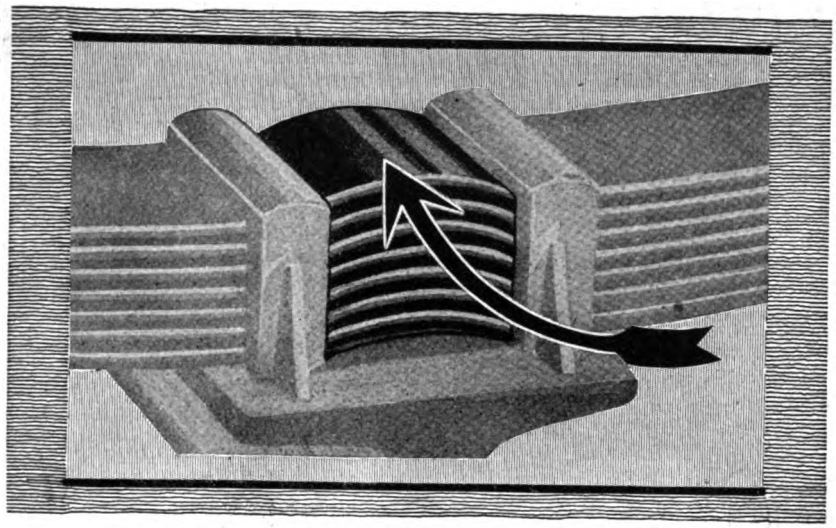
A packing which should be of interest to our readers is sold by the Endura Mfg. Co., 63d Street and Eastwick Avenue, Philadelphia, Pa., and 45 Lafayette Street, New York City, N. Y. This packing can be used very extensively in the car. It is sold in sheets and said to be oil-proof, gasoline-proof, and to withstand both hot and cold water.



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Giving service

—and making it mean something



TUTHILL Titanic Springs give and offer the kind of service that helps build business.

First, they are built strongest to wear longest where three out of four springs give way first.

A solid bed of jolt-and-jar-taking steel meets every strain with swift response and sure strength. No center bolt holes—or nibs—weaken the vital point. The center never snaps, causing sudden breakdown.

Tuthill Titanics are so perfectly constructed that they are guaranteed at all points and in every respect for one year—and guaranteed *forever* against center breakage—where three ut of four ordinary springs break. Thousands, through years of steady use, prove that the guarantee holds good.

Quick service when needed, is badly needed—and there's a Tuthill Distributor near at hand wherever the motorist happens to be. Tuthill Distributors carry representative stocks and can always provide the right spring for any passenger car or truck.

Utmost convenience and minimum loss of time in spring replacement awaits the motorist when he looks for Tuthill Titanics. Absolute confidence and steadily increasing sales are assured the dealer handling Tuthill Titanics.

See "Chilton's" or "Auto Trade Directory" for complete list of Distributors.



Tuthill Spring Company
(Established 1880)
760 Polk Street
Chicago, Ill.

GUARANTEED
TUTHILL
TITANIC
REGISTERED TRADE MARK
SPRINGS
LUBRICATED

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"Why Is Carbon?"

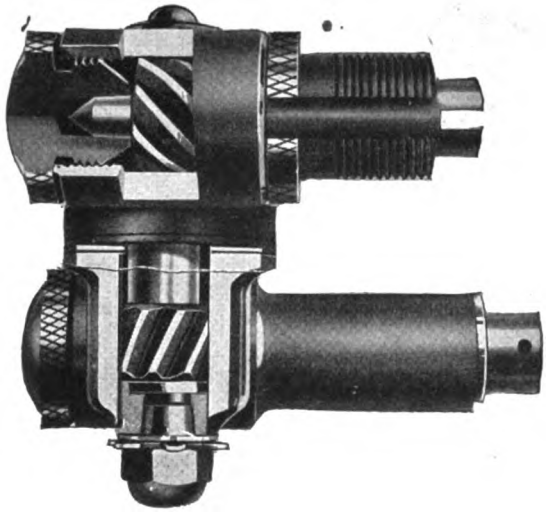
A little booklet entitled "Why is Carbon?" has been published by "C-P" Chemical Co., 305-326 River Street, Chicago, Ill., the home of Carbon-X. This booklet seems to be of unusual interest to the car owner, as it discusses the so-called carbon problem in an honest and straightforward manner, and the motorist will no doubt find much valuable information contained therein. It is our understanding that the publishers will send a copy of "Why is Carbon?" free to anyone on request.

F. W. S. Swivel Joint.

F. W. Stewart, manufacturer of a number of live items in the accessory line, believes that if you have a good thing you ought to show it.

He is a firm believer in the F. W. S. Swivel Joint for speedometer drives and is putting out a novel idea for the jobbers' salesmen to demonstrate the quality of that Swivel Joint, by showing the "inside of the works."

The Swivel Joint furnished has sections cut out as shown in the illustration, displaying the various points of superiority so that they may be readily understood by those not entirely familiar with the structural details of such devices.



Section of the F. W. S. Swivel Joint.

They are sent out to jobbers for the use of their salesmen when calling on their trade.

Owing to the considerable expense in producing these cutout Swivel Joints, they are not being sent broadcast but any recognized jobber may secure a number sufficient for their salesmen by writing to F. W. Stewart, 1404 S. Michigan Avenue, Chicago, Ill.

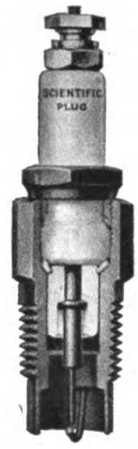
Returns From Service.

Mr. C. B. Johnson, formerly the sales manager of the Advance Automobile Accessories Corp., has been released from his military duties and has taken the position of sales manager of Auto Components, Inc., Chicago, Ill. This concern has been organized to market the Red Star Timer for Ford cars.

Scientific Spark Plug.

We reproduce herewith a cross sectional view of a new spark plug which is being manufactured by Geo. T. Simmons of Janesville, Wis. If the reader will examine the illustration carefully he will notice that there is a unique feature about this plug. Its skirt is especially thin.

When in operation the heat generated by the explosion tends to heat this thin skirt, resulting in the burning of oil or carbon deposits from the electrodes. From experience the reader knows that in any plug the center electrode is seldom covered with soot or oil. The deposits usually are found inside the body of the device.



The Scientific Spark Plug

So with the construction of the Simmons plug; the manufacturer claims that the design embodies a new principle. The plug is very accessible and easily cleaned. The insulating material is of extremely high resistance and is said to withstand the engine heat to a remarkable extent.

Livingston Radiator Corporation.

It is announced that the rights to manufacture radiators for automobiles, trucks and aeroplanes under the Livingston patents, formerly owned by the Livingston Radiator and Mfg. Co., at 205 West 75th Street, New York, have been purchased by the Livingston Radiator Corporation of the same address.



A Livingston Radiator.

The new corporation also takes over all the mechanical equipment and processes of manufacture of its predecessor, and will place the production of this type of radiator on a quantity basis.

A new management will have charge of the affairs of the new organization. The inventor, D. McRa Livingston, again becomes associated with the manufacture of radiators under his patents, and will be vice-president and consulting engineer. E. G. Hines is president and general manager.

The Livingston Radiator was specified for installation on over 50 per cent. of all aeroplanes purchased by the aerial forces of the U. S. Army and Navy.

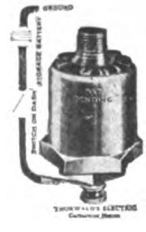
S. O. S. Storage Batteries.

Readers who intend to purchase storage batteries should by all means investigate the batteries sold by the Victor Storage Battery Co., 701 Fourth Avenue, Moline, Ill.

This concern put out the S. O. S. storage batteries and guarantee their product against the ruinous sulphation which attacks ordinary plates. They also claim that S. O. S. plates (which may be had to fit other batteries) will not buckle during the life of the battery. Dealers who have any call for storage batteries should write this concern for their list and pocket battery guide which shows the correct battery to use for any make of car.

WHY BOTHER

priming or pouring hot water on carburetor when you can **Vaporize** the gasoline with Thorwald's Electric Carburetor Heater and start your motor very easily on the coldest day of Winter.



FLASH



and your tire is off, **The Lightning Tire Tool** is **positively** the most effective Tire Tool ever designed for removing and putting on tires, it loosens the beads from rim.

Write for Discounts

THORWALD MFG. & SALES CO.

13th and Jackson Sts., Omaha, Neb.

IN WRITING

to advertisers for circulars or information, you are earnestly requested to mention in each case that the advertisement was seen in the "Automobile Dealer and Repairer." By so doing you will confer a favor on both publisher and advertiser.

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SAVE GAS
SAVE TIME
SAVE ENERGY

Fair weather carburators are wasters in cold weather.

If you are using the common type of carburetor on your Ford motor, you know it.



Price with Auxiliary Air Control **$12.00**

A "D. & B" Carburetor

with Springless Mixing Valve and Auxiliary Air Control

insures a quick start and economical operation regardless of weather.

It is designed for a Ford motor, makes the Ford owner independent of weather and insures maximum mileage and power throughout the year.

GET ONE NOW AND STOP KICKING

Manufactured by

O. C. HARRINGTON CO.,
343 N. Crawford Avenue, - Chicago, Ill.

Mid-West Distributors: GRAY-HEATH CO., 1440 Michigan Ave., Chicago, Ill.

New England Distributors: The POST & LESTER CO., 112 Allyn St. Hartford, Conn.

A D & R

IF YOU'VE GOT A GOOD THING

back it up with good advertising copy in the Automobile Dealer and Repairer — don't let your product die of dry rot.

In our "put it over" department we create advertising ideas, draw pictures, border designs and lay-outs which attract the reader's attention—holding, at the same time, the proper commercial value.

We write advertising that will boost your product—bring it from obscurity and, through our medium, put it into the markets of the world.

Write or Wire

MOTOR VEHICLE PUBLISHING CO.
71-73 MURRAY STREET : : NEW YORK CITY

"YANKEE" TOOLS

Make Better Mechanics



Here's one of the famous "YANKEE" Tools that does automatically what other tools compel you to do by hand. Steady your work on the table with one hand; turn the crank with the other.

The automatic Friction Feed runs the drill rapidly down to the work and takes the place of the third hand you haven't got.

The instant the drill point touches the work the Ratchet Feed "takes hold." The drill is fed through the cut—steady, positive, smooth. No need to worry about broken drill points; rather, think of the time and labor you could save with other and equally ingenious "YANKEE" Tools.

"YANKEE" Bench Drill

"YANKEE" Bench Drill No. 1005. Two speeds, 3-jaw chuck, holds drills up to ½ in. Height 28 in. Price (Philadelphia) . . **$19.25**

"YANKEE" Bench Drill No 1003. 2-jaw chuck, holds drills up to ¼ in. Height 18¾ in. Price (Philadelphia) **$11.50**

"YANKEE" Vise No. 990. Accurately machined sides, ends and bottoms, for holding work on Bench Drills and other machine tools. Swivel-jaw for taper work; groove for rounds. Base 6 in. long, 2⅝ in. wide. Price **$2.50**

Your Dealer Can Supply You

Write for Free "YANKEE" Tool Book, illustrating efficiency tools.

North Bros. Mfg. Co., Philadelphia



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Classified Advertisements

Under this head will be printed advertisements of **Second Hand Cars Wanted or for Sale, Accessories of any kind Wanted or for Sale, Shops for Sale or Rent, Situations or Help Wanted, Second Hand Tools or Machines for Sale or to Exchange,** at the uniform price of **five cents a word,** including the name and address, for each insertion, payable in advance. **No advertisement will be inserted for less than 75 cents, however small.** Remittances may be made in postage stamps or in any convenient way.

Special rate of 30 cents per nonpareil line for each insertion if taken for 12 consecutive times.

Classified Advertisements

Address MOTOR VEHICLE PUBLISHING CO., 71-73 Murray Street, New York.

Tires

DOUBLE TREAD TIRES
GUARANTEED

SPECIAL OFFER TO AGENTS. Write for Catalogue

Get our special price on new tires

M. LIBEN & CO.

205-A West 48th St. New York City

Exceptional Values
IN
DOUBLE CHAIN STITCHED TIRES

Size	Plain	Non-Skid	Size	Plain	Non-Skid
28x3	$4 50	$5.00	35x4	$10.00	$11.00
30x3	5 50	6.00	36x4	10.00	11.00
30x3½	6.50	7.75	34x4½	11.00	12.00
32x3½	8.00	9.00	35x4½	11.00	12.00
31x4	9.00	10.00	36x4½	11.00	12.00
32x4	9.00	10.00	37x4½	11.00	12.00
33x4	9.00	10.00	35x5	11.00	12.00
34x4	10.00	11.00	36x5	12.00	13.00
			37x5	12.00	13.00

Have your own tires Double Treaded by the same process. Our charges are only 40% off the above mentioned prices.

Send your order to our nearest office.

LEON JAFFESS, Inc.

252 West 55th Street, New York City — **6106 Euclid Avenue, Cleveland, Ohio**

SPECIAL OFFER TO DEALERS

This lot of Braender tubes will be sold in quantity lots, assorted sizes, at $1.50 each.

18—28x3	20—30x4	6—32x4½
30—30x3	6—32x4	10—37x4½
19—28x3½	5—33x4	10—36x4½
72—30x3½	7—34x4	5—37x4½
2—31x3½	25—35x4	5—35x5
32—32x3½	18—36x4	15—36x5
20—31x3½	5—37x4	7—35x5

CONN. AUTO PARTS CO., Inc.

1070 Main St., Hartford, Conn.

For Sale

PYRMA ALUMINUM HEEL PLATES cover or prevent unsightly holes in floor board coverings. 75 cents each. These plates and PYRMA ALUMINUM MATTING for sale by all up-to-date dealers. The Erdle Perforating Co., Rochester, N. Y.

FOR SALE—Patent for practical motor sled. A great winter seller. Ernest Tange, R. F. D. No. 1, Northville, N. Y.

FOR SALE—Fine automobile trimming, accessory and leather goods business, and good home; best orange section of California. Address J. S. M., Box 371, Lindsay, California.

Tires

BUY EARLY AND SAVE MONEY
Double Tread Tires and Tubes

GUARANTEED

Come to the Tire Clearing House—here are prices—clear cut and plain as daylight. We buy wholesale the best "try out" Tires—and you get the benefit—you want truthful tires, and truth is never crushed to earth if given a square deal—real truth is puncture proof—

SO ARE OUR TIRES.

Size	Plain	Non-Skid	Tubes
28x3	$4.40	$4.95	$2.00
30x3	5.50	6.05	2.00
30x3½	6.60	7.15	2.65
32x3½	7.15	7.70	—
34x3½	8.25	8.80	3.00
32x4	9.50	10.50	2.75
33x4	9.50	10.50	3.25
34x4	9.80	10.80	3.50
35x4	9.90	11.00	3.50

Get your order in quick for goods listed here—by all means get in touch with us for further information about our special process—it means money in your pocket. Get in right—write to-day—yes—to-day.

Look up rating in Dun's or Bradstreet's.

Size	Plain	Non-Skid	Tubes
36x4	$9.90	$11.00	$3.60
32x4½	9.90	11.00	3.60
34x4½	11.00	12.10	4.00
35x4½	11.00	12.10	4.10
36x4½	11.00	12.10	4.25
37x4½	12.10	13.20	4.35
34x5	11.00	12.10	4.50
35x5	13.20	14.30	5.00
36x5	13.20	14.30	5.00
37x5	13.75	14.85	5.00

For (non-skid) sizes up to 32x4, 50c extra; all other sizes $1.00 extra.
For rebuilding your old tires we charge you 60% of the above prices.

B. LIBEN & COMPANY

261-A West 54th Street — **NEW YORK CITY** — **112-A East 110th Street**

THE HOME OF DOUBLE THREAD TIRES

PRICE WRECKERS
Double Tread Tires with Double Lock Stitch

30x3	N. S.	$5.50	34x4½	N. S.	$8.50
30x3½	"	6.50	35x4	"	9.00
32x3½	"	7.00	36x4	"	9.50
31x4	"	7.25	36x4½	"	10.00
32x4	"	7.25	36x5	"	10.00
33x4	"	7.50	37x4½	"	10.00
34x4	"	8.00	37x5	"	10.00

We carry a full line of Firsts and Factory Blemished Tires and Tubes at moderate prices.

ROYAL TIRE EXCHANGE

282 Halsey St., Newark, N. J.

DOUBLE TREAD TIRES—We carry a full line of new and used tires and tubes. Ginsberg & Berkowitz, 236 W. 48th Street, New York City.

Patent Attorneys

PATENTS PROCURED AND TRADE-MARKS REGISTERED—Eighteen years' experience. Instructions and Terms on request. Robb & Robb, Attorneys at Law, 888 Southern Bldg., Washington, D. C. 1340 Schofield Bldg., Cleveland, Ohio.

PATENTS—Don't lose your rights. Send for blank form "Evidence of Conception" to be signed and witnessed. Establish your rights in the start. Form and information concerning patents free. Lancaster and Allwine, 212 Ouray Bldg., Washington, D. C.

PATENTS SECURED—G. L. Parker, Patent attorney, McGill Building, Washington, D. C. Inventor's Handbook upon request.

RALPH N. FLINT, M. E.—Attorney-at-law in Patent Causes, late Assistant Examiner Internal Combustion Engine Division, U. S. Patent Office. Specialist in Internal Combustion Engine Cases. 2 Rector Street, New York. N. Y.

Tires

INSYDE TYRES,

inner armor for automobile tires. Double mileage. Prevent punctures and blowouts. Details free. Agents wanted. Big profits.

AMERICAN ACCESSORIES CO., Dept. AD3. Cincinnati, Ohio

Magnetos and Batteries

Hecht's Magneto Exchange

Dealers in Magnetos of all Makes. Lighting Systems and Self Starters.

Expert Repairing of All Makes.

Express your Magneto, Starter and Generator to us. Same will be repaired and returned same day as received.

Distributors and Service Station for

Swiss, Heinze, National and Michigan Magnetos

— Also —

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A New Sales Promotion Manager.

As a result of a new and more aggressive policy of the Connecticut Telephone & Electric Co., of Meriden, Conn., Mr. O. H. Adams has been given the position of Sales Promotion Manager. This company is a large and growing concern, being one of the biggest producers of interior telephone systems, and having developed and manufactured during the war a goodly percentage of the field wireless equipment for the U. S. War Department. Mr. Adams began his duties in his new capacity on December 30th, 1918, and all indications point to a bright future.

St. Louis Motor Generators.

The attention of our readers is called to the big field and big money offered in storage battery recharging. The work is easily learned and the profits large. In practically any garage where outside current is available, storage batteries may be charged. In most cases the outside current is had at high voltages, 110 or 250, either direct or alternating.

Where such high voltage is had, current cannot be used economically because much is wasted in resistance. The alternating current must be changed by some means into direct current before it can be used. There is one way of accomplishing either or both of these purposes; that is to drive a motor from the outside line and use the power from this motor through a generator to produce low voltage current, for battery charging.

The St. Louis Electrical Works, 4057 Forest Park Boulevard, St. Louis, Mo., manufacture a combination unit consisting of a motor driven from the outside current, and a generator which produces direct current for charging the batteries.

These machines may be obtained in two sizes. The smaller has an output sufficient to charge as many as eight six-volt batteries at one time, while the larger size gives sufficient current to charge as many as twenty-four.

The motor and generator are both mounted upon a substantial base. No gearing is necessary between the two since both operate upon the same shaft. With the equipment is furnished a suitable switchboard equipped with a rheostat, ammeter and switches for controlling the current, so that any number of batteries may be charged from one to the capacity of the machine.

Magic Rubber Mend.

The Eastern Rubber Co., of 1529 Ridge Avenue, Philadelphia, Pa., are putting on the market a product which deserves mention. This product is known as Magic Rubber Mend, and can be used for patching not only tires and tubes, but hot water bottles, rubber boots, and in fact anything made of soft rubber.

The product is readily applied without the use of heat or acid. There is no danger of under-vulcanizing or over-curing, and the manufacturers claim that a patch made with it will outwear the tube or tire upon which it is placed.

Duplicate Parts.

The Nilson-Miller Co., 1302 Hudson St., Hoboken, N. J., announce that they are able to duplicate any machine part of any automobile now on the market, so that anyone who owns an orphan car, or anyone who owns a car, the parts for which are difficult to obtain, may write to Nilson-Miller at the above address, giving them the specifications, and obtain such a part.

This company makes a specialty of grinding cylinders and fitting both pistons and rings. They also carry a large line of gears and sprockets.

Pirate Parts Suit Settled Out of Court.

Despite the fact that there has been considerable talk of concerted action on the part of ignition makers to preclude the manufacture of replacement parts for their systems by others than themselves, nothing came of it until the Connecticut Tele. & Ele. Co., of Meriden, Conn., took the bit in its teeth and brought suit in equity in the District Court of the United States, Northern District of Illinois, Eastern Division, against Paul G. Niehoff & Co., Inc., of Chicago. The bill charged infringement of the following patents:

No. 1,204,104, dated November 7, 1916
No. 1,217,566, dated February 27, 1917
No. 1,221,239, dated April 3, 1917
No. 1,248,612, dated December 4, 1917

The bill also charged practices of unfair competition in the sale of parts shaped and dressed in simulation of the plaintiff's corresponding parts, and prayed for an injunction and accounting on both phases of the bill.

This case is of particular interest to the public on account of the fact that one of the largest manufacturers of ignition systems instigated this suit against a large manufacturer of what is commonly known as pirate parts.

The Niehoff Co. succeeded in settling this suit before coming to trial, by recognizing the validity of these patents after careful investigation and agreeing to discontinue the production and sale of all infringing parts they had been making to fit Connecticut systems, and to substitute for them genuine parts made by the Connecticut Co.

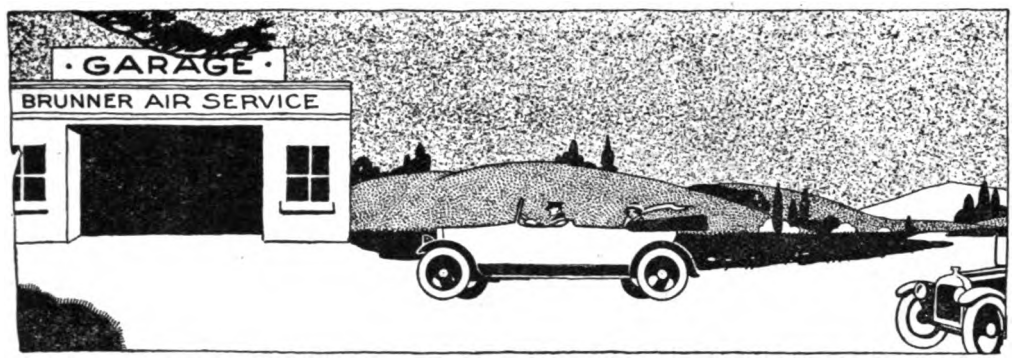
The correspondence which passed between Mr. Niehoff and the Connecticut Co. between the time the suit was instituted and the settlement, brought out the fact that the Paul G. Niehoff & Co., Inc., never relished its position as a pirate parts maker; but that the independent attitude of the ignition manufacturers not only made it almost impossible to do business in genuine parts and practically created the file for "pirate parts."

Clearly a little more of the live and let live spirit is the solution of the whole situation.

For the out and out manufacturer or distributor of "pirate" parts, there should be no place in our commercial scheme, as there is every promise for urging ignition makers to fight the pirate parts evil by enlisting such distributors as prefer a legitimate business in their side, instead of standing pat on a policy which arrays them against them.

Mr. Niehoff expressed the hope that the arrangement which now exists between his concern and the Conn. Company would prove the beginning of better conditions all around and that his action would have its effect on those engaged in the pirate parts business, also that the live and let live spirit of the Connecticut Company would have its influence on the future policy of other ignition manufacturers, which would bring about results of mutual benefit, but until such arrangements are entered into, they will continue to establish their Service Stations as heretofore, and place their famous "Cash Registers of Contact Parts," stocked with other than genuine parts for all systems, excepting Connecticut.

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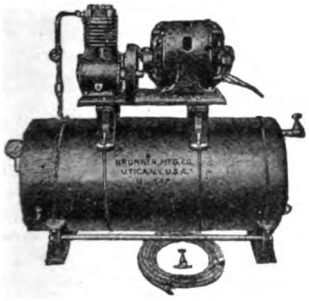
BRUNNER AIR SERVICE
AIR
THE MOTORIST WHO IS BRUNNERWISE KNOWS BRUNNER SERVICE SATISFIES

This red and blue enameled sign is distinctive—not easily confused with others. The motorist looks for it. It brings him to you for service and sales. Furnished FREE to users of Brunner Air Compressors.

THE BRUNNER AIR SIGN MEANS GARAGE SUCCESS

The ability to render, permanently, satisfactory service spells success in every line of business. The Garageman is no exception to the rule. Be his organization ever so perfect and his equipment the best,--if there is but one point in which service is lacking or not always available or satisfactory, that is enough to keep hundreds of dollars away from him.

A dependable air compressor is a vital part of the garage service. The motorist expects to find air service in every garage and he will go to the one that renders the most dependable service.



No. 542 Outfit

Ideal for installation where space is limited. Has ample capacity for garage housing up to forty to sixty cars. The motor is ½ H. P., securely bolted to substantial cast-iron base and mounted on a 32 gal. Welded Open Hearth Flange Steel Air Tank, tested to 300 pounds

The Compressor is our No. 102, 2-cylinder air cooled, each cylinder fitted with a safety valve than can be instantly set for any desired pressure and absolutely dependable under all conditions.

The outfit includes air gauge, check valve, 25 feet of 3/16 in. "Resistoil" air hose, connected to one No. 82 needle valve on one end and having automatic tire connections on the other.

When used with our Model M Controller, this outfit is entirely automatic.

BRUNNER Air Compressors

The Brunner Air Compressor was designed especially for garage use It is built in the largest, best equipped plant in the world devoted to the exclusive manufacture of garage air compressors. The employees of this plant take great pride in the product, and every part of the work and every piece of material is the very best. Bearings are as carefully made and fitted, cylinders as carefully ground, piston rings fit as perfectly, as in a high-priced automobile engine.

On a Brunner Compressor there is no need for attachments to help the motor carry the load—no restriction of lubrication to pull down the efficiency, increase wear and run up bigger-than-necessary electric bills. Maximum efficiency is attained with a minimum of operating and up-keep cost. Brunner Compressors are built to operate under the hardest working conditions, day out and day in, with but little attention and yet perform consistently and satisfactorily.

Send for Catalogue No. 15, showing the most complete line of small air compressors on the market, and the name of the Jobber covering your town.

If you want assistance in planning or improving your air device, our factory engineers are at your command. Tell us how we can serve you best.

BRUNNER MANUFACTURING COMPANY

GENERAL OFFICE AND PLANT: UTICA, N. Y.
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The Brunnerwise Motorist

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On the Business end of a Truck.

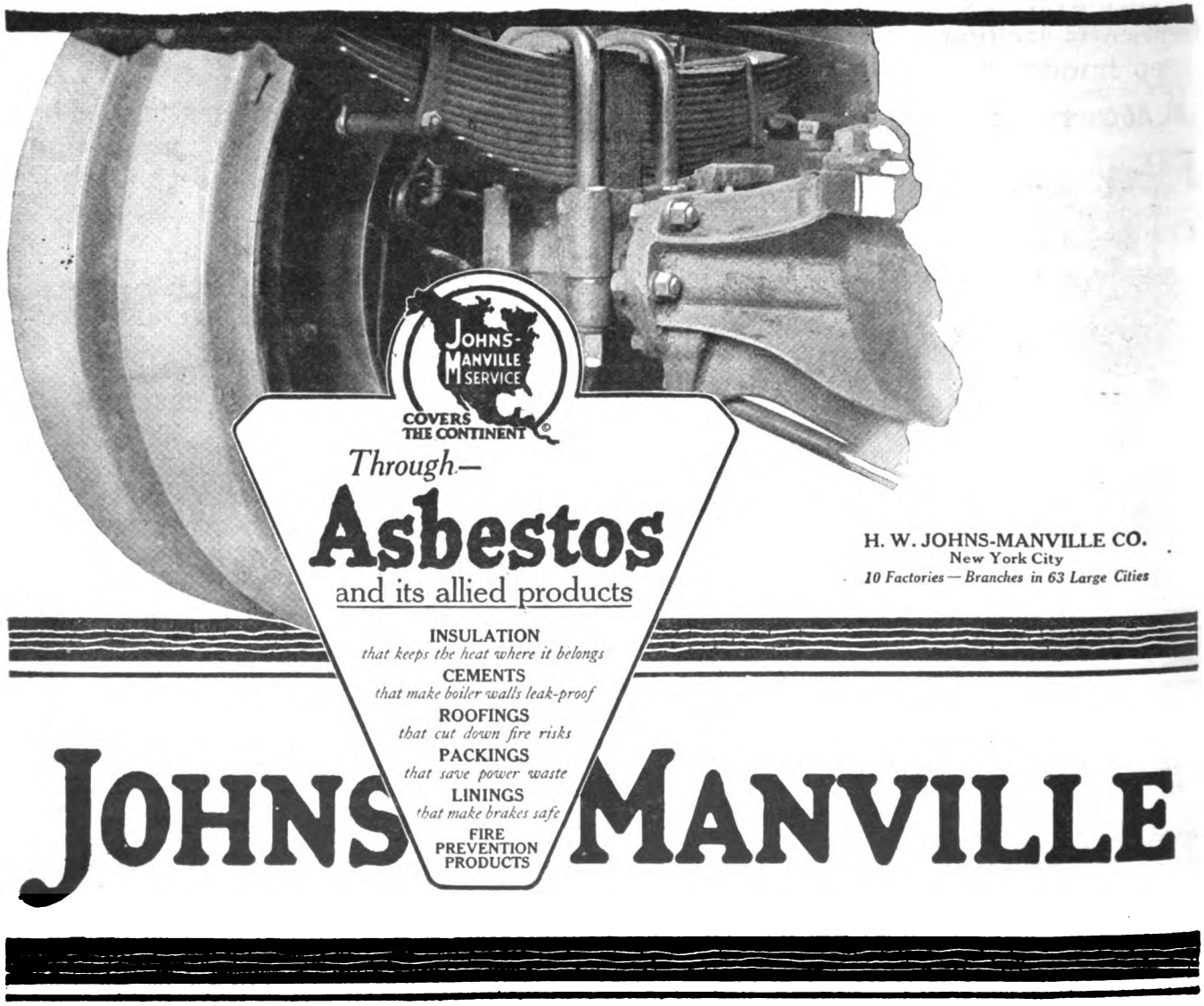
Any brake lining soon proves the truth of the statement, "The better the Asbestos, the better the Brake Lining." No service demands more of brakes, and no lining ever meets a harder task than when it is on the business end of a truck.

That's why you can sell a brake lining on the quality of its Asbestos Fabric.

JOHNS-MANVILLE
NON-BURN ASBESTOS BRAKE LINING

The fabric of NON-BURN is woven of special, selected fibre from the Johns-Manville mines —culled from tons upon tons of asbestos—and chosen for its Brake Lining fitness.

And the Johns-Manville sales policy protects you in every way, assuring you of a substantial profit on each sale.



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—and to protect the valuable truck cargoes of today.—

THE values of cargoes moved by motor transport are higher today than ever before. The motor truck is probably insured, but few, if any, cargoes are insured while in transit.

With a Johns-Manville Fire Extinguisher on a truck every load is protected. Spread over a number of cargoes the cost of protecting each cargo by having a Fire Extinguisher handy is only a few cents per load. This is a strong selling argument—use it.

The Johns-Manville is the only one-quart extinguisher that can be discharged in either of two ways. If the fire is accessible, pump it as with ordinary extinguisher; if hard to get at, or if the operator is in cramped quarters, the stream can be discharged by air pressure, allowing the extinguisher to be aimed like a fireman's hose. Prove this to your customer—put his thumb on the lever.



JOHNS-MANVILLE FIRE EXTINGUISHER

Can be operated by anybody, in any position, anywhere

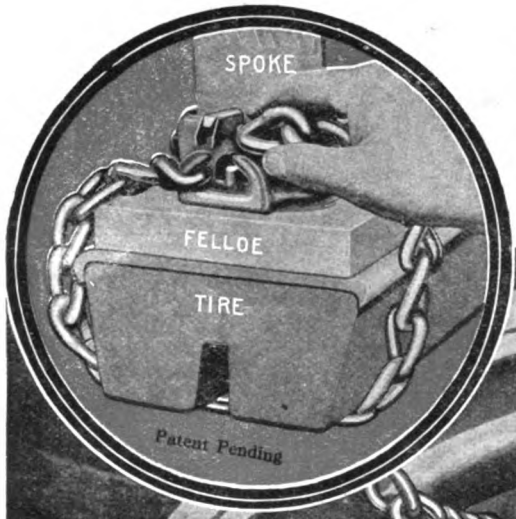
Price $10 $10.50 West of the Rockies
In Canada $12. West of Calgary $12.50
Brass or Nickel. Bracket included.

Automotive Equipment

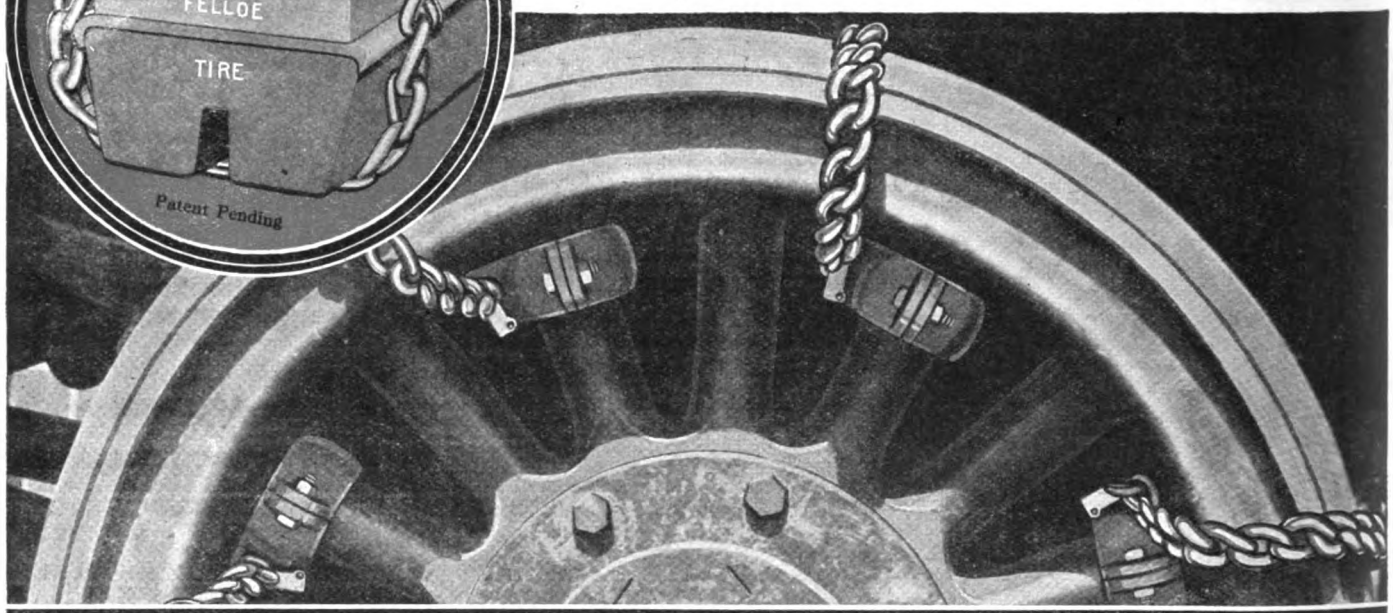
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ARROW GRIP

NON-SKID CHAINS FOR SOLID TIRE VEHICLES



Just slip chain around and press down latch —that's all. Latch can't accidentally open. Chain is 100 per cent. overstrength; clamp is rustproof. To detach, slip any handy tool under latch —lift up chain.



Simplicity—Safety—Salability

400,000 trucks in use — and every one means a potential Arrow Grip sale.

Not only on snow-bound streets and roads—but wherever there is mud or wet or possibility of skidding, Arrow Grips are used because they can be attached easily and quickly and with least labor.

Arrow Grips are now big all year-'round sellers.

Note the simplicity of Arrow Grip construction. Note that there are but two parts. Note that there are no specially forged connecting links in the chain. Note that one hand can attach or detach, that no special tools are needed. Note that the pull is on the ***felloe***—not on the spokes or the clamp.

Arrow Grips are the ***matchless*** non-skid device.

Write for our dealer offer before it is too late.

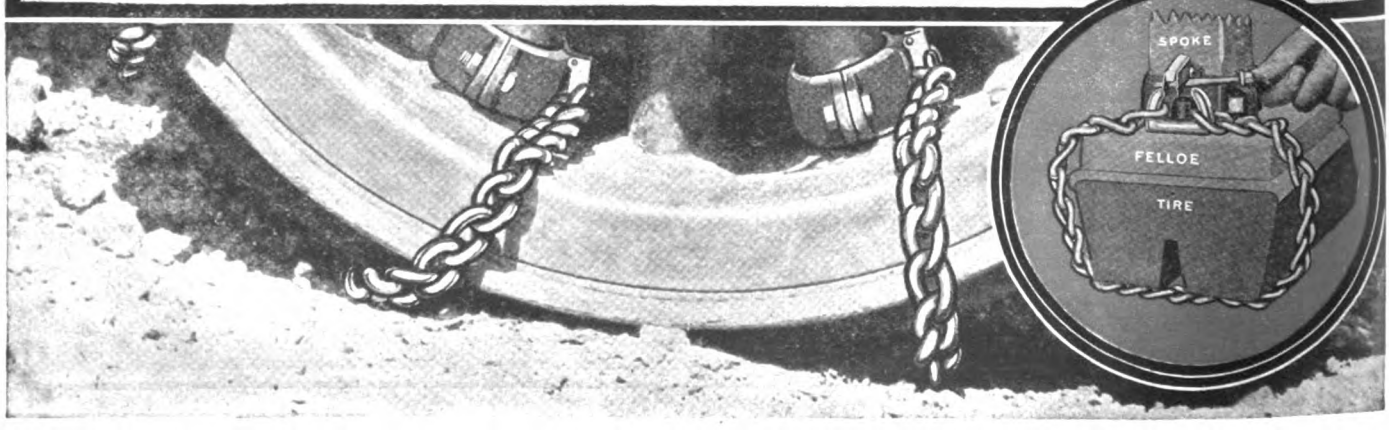
Some Arrow Grip Users

Standard Oil Company	American Express Company
Louse-Wiles Company	New York Telephone Company
Swift & Company	American Can Company

ARROW GRIP MANUFACTURING COMPANY, Inc., Dept. I, Glens Falls, New York

CHICAGO DISTRIBUTING DEPOT: 617-19 Fulton Street. NEW YORK DISTRIBUTING DEPOT: Arrow Specialty Co., Inc., 16 W. 61st St., N.Y. City.
CANADIAN FAIRBANKS-MORSE CO., Ltd., 84-98 St. Antoine St., Montreal, Que.

Arrow-Grips will be exhibited at the New York Show in the Madison Square Garden, from February 1st to 15th, and at the Chicago Show at the Coliseum, January 25th to February 6th.



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The NATION'S POWER

Used Exclusively by

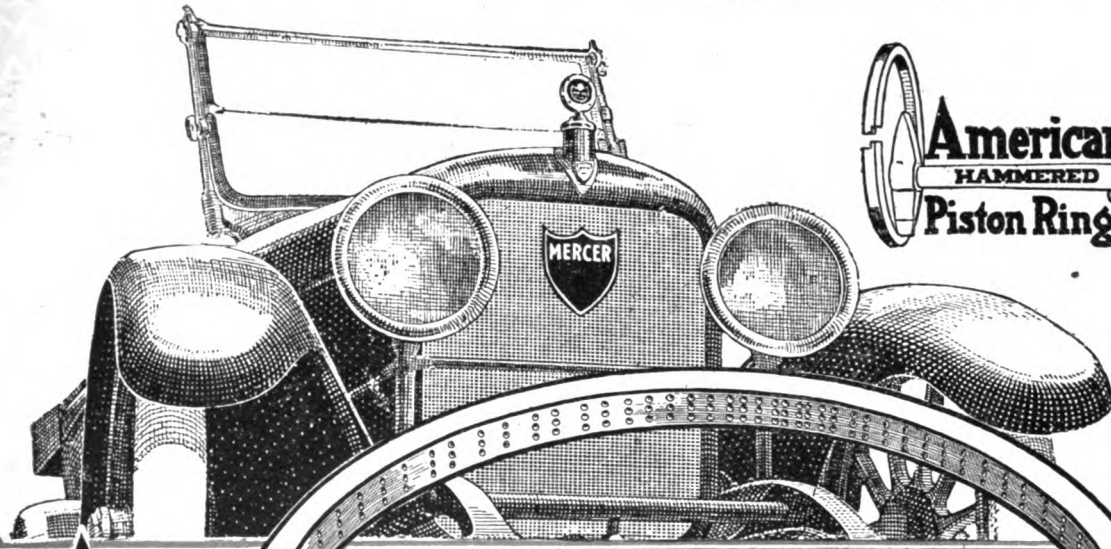
Pierce-Arrow
Winton
Mercer
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Aeromarine

IN the sum total of results achieved by the various engines of war in the Great Conflict, the part played by *motors* will furnish an exciting chapter of its history.

American Hammered Piston Rings had the distinction of being chosen for War motors by the United States and our Allies. The consequent enormously increased production which this necessitated equips us splendidly to handle a much greater volume of after-war business.

Manufacturers, Jobbers and Dealers are urged to communicate with us relative to their 1919 requirements

THE HAMMERED PISTON RING CO. OF AMERICA
Newark, New Jersey, U. S. A.



American HAMMERED Piston Rings They're LEAK TIGHT

AMERICAN Hammered
Piston Rings
THE QUALITY IS HAMMERED IN

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AHLBERG
REMADE
BALL BEARINGS

A ball bearing remade the Ahlberg way has all the fine points of a new bearing plus the final test of actual service. Therefore, when you receive a remade bearing, you know that it is free from defects and is the best bearing money can buy.

Your old worn-out ball bearings are replaced immediately with remade bearings from stock; all types and sizes being carried at all times for your convenience.

The cost is much lower than that of new bearings.

Call on our nearest branch for ADVICE and SERVICE.

THE SIGN OF SERVICE

AHLBERG
BEARING COMPANY

2636 Michigan Avenue, Chicago, Illinois

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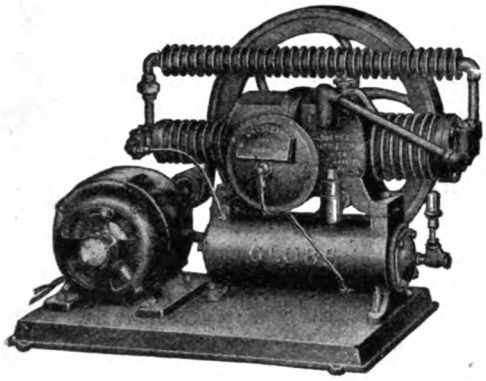
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Boston	Detroit	Minneapolis	Portland, Ore.	St. Louis
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Authorized Remakers under Conrad Patents

SPECIALS

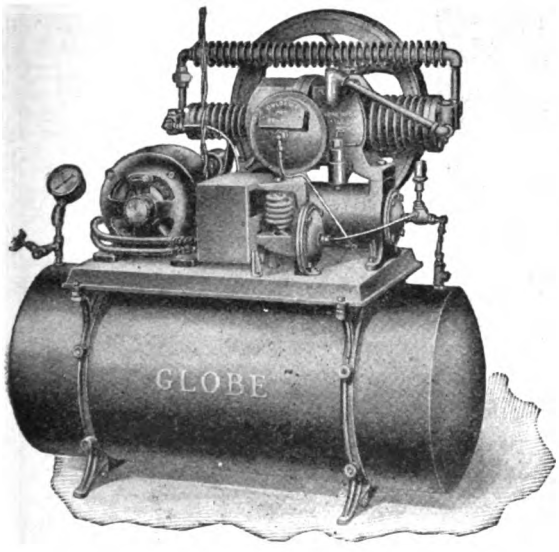
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What our customers say about 'em is the best endorsement for GLOBE AIR COMPRESSORS



INVARIABLY they make good—and give satisfaction. We can cite or submit letters from any number of our customers to show you just what GLOBE air compressors are doing.

Not long ago, one of our customers in Springfield, Ill., (name on request) wrote and told us, voluntarily, that their GLOBE machine was giving perfect satisfaction, and they would recommend it to anybody.



Another one of our customers at Maquoketa, Iowa, (name on request) said their GLOBE worked like a charm, and that they felt safe in predicting that the saving of electricity used with the GLOBE would almost pay for the cost of the pump within a year.

You take no chances with a GLOBE

Inquiry coupon brings you further particulars

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Feb. 1st to 15th

Demonstration Booth No. 374

(American Pump and Tank Co.)

Madison Square Garden Elevated Platform

CHICAGO SHOW

Jan. 25th to Feb. 1st

Demonstration Booth No. 89

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Gentlemen: Without any obligation on my part, please send full information on the items checked (x) below:

[ ] Air Compressor for Line Shaft Drive.
[ ] Air Compressor for Direct Motor Drive. [ ] With Motor.
[ ] Automatic Air Plant for Free Air. [ ] With Motor.
[ ] Air Compressor with Air Cooled Gasoline Engine.
[ ] "DEAD EASY" Tire Pump for resale.
[ ] I have or can get Electric Current. [ ] Single Phase. [ ] Two Phase. [ ] Three Phs. [ ] Direct. [ ] Voltage. [ ] Frequency. [ ] Cycles.
I have power [ ] Steam.....H. P. [ ] Gas Engine.....H. P. [ ] Electric Motor.....H. P.
I have a [ ] Garage. [ ] Tire Shop. [ ] Machine Shop.

Name..... Date.....

Address.....

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A SURE SIGN of carbon is a smoky exhaust, due to lubrication getting *past* the piston rings up into the combustion chambers where it *burns*. Leaky piston rings waste as high as 25% gasoline —one drop in four.

HI-COMP PISTON RING

"THE RING THAT MAKES THE MOTOR SING"

are the best gas-tight rings for overcoming engine troubles due to carbon—knocking, skipping, faulty ignition; valve pitting, wearing down of cylinder walls, piston and piston rings; smoky exhausts.

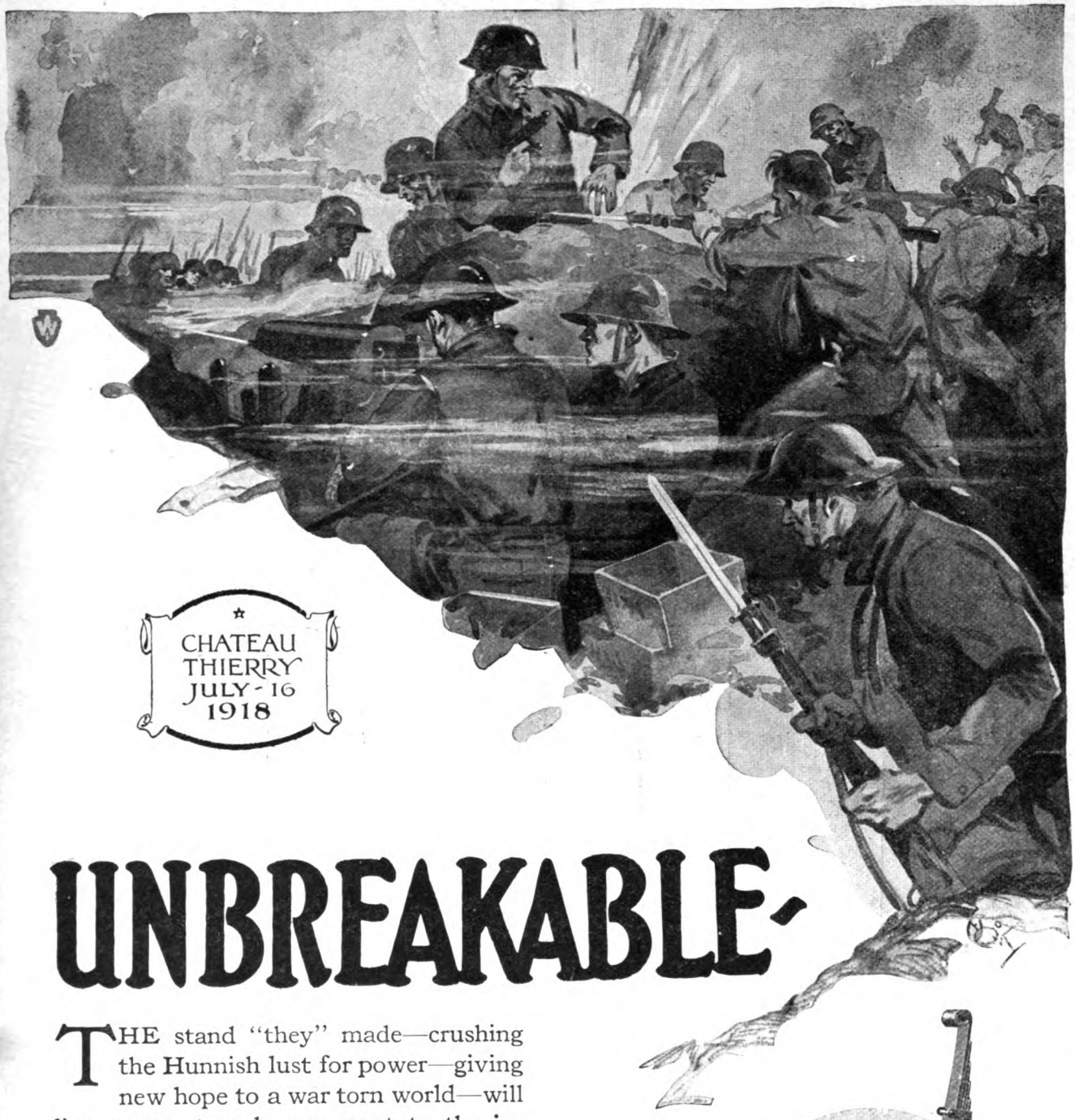
Hi-Comp Piston Rings are made from two perfectly balanced perfect eccentric rings into one absolutely gas-tight concentric ring. Each ring ground under oil — not buffetted — to preserve the true temper of the secret process gray iron and ensure high polish and gas-tight fit. Won't wear cylinders out of round — *proof* of gas-tightness. Make reboring of average cylinders unnecessary — an exclusive Hi-Comp advantage. Hi-Comp Piston Rings deliver every ounce of power from every drop of gasoline on to the piston head— no power or oil can get past them!

It will pay you to install Hi-Comp because of the satisfaction they give to you and your customers. Fully guaranteed by an old established piston ring company to give MORE POWER on less gasoline and oil. Write for booklet, specification chart and details of 90-day trial guarantee

The Continental Piston Ring Co., Memphis, Tenn.

The Ring that Makes the Motor Sing

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UNBREAKABLE-

THE stand "they" made—crushing the Hunnish lust for power—giving new hope to a war torn world—will live as an eternal monument to the indomitable spirit of American manhood. Their's the honor: sublime, imperishable.

Ours the satisfaction of knowing that somewhere behind the lines Government trucks equipped with Harvey Springs served them with supplies.

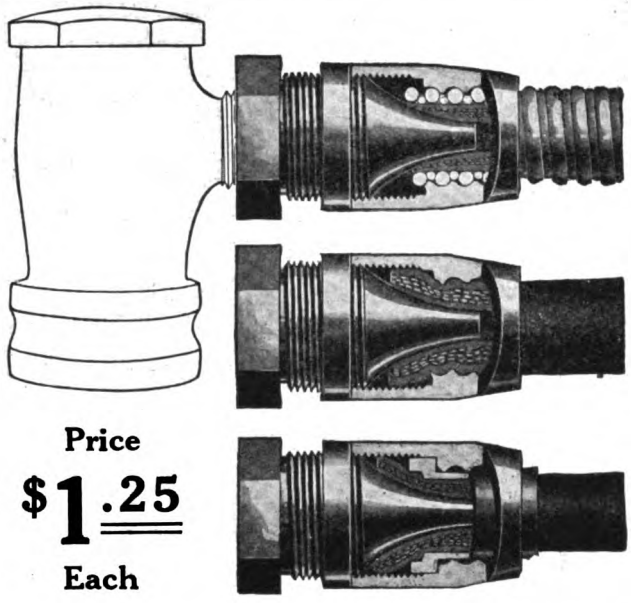
Send for latest Spring Book showing 1000 Automobile Springs.

HARVEY SPRING & FORGING CO.
921 17th Street RACINE, WIS.



PRACTICALLY UNBREAKABLE

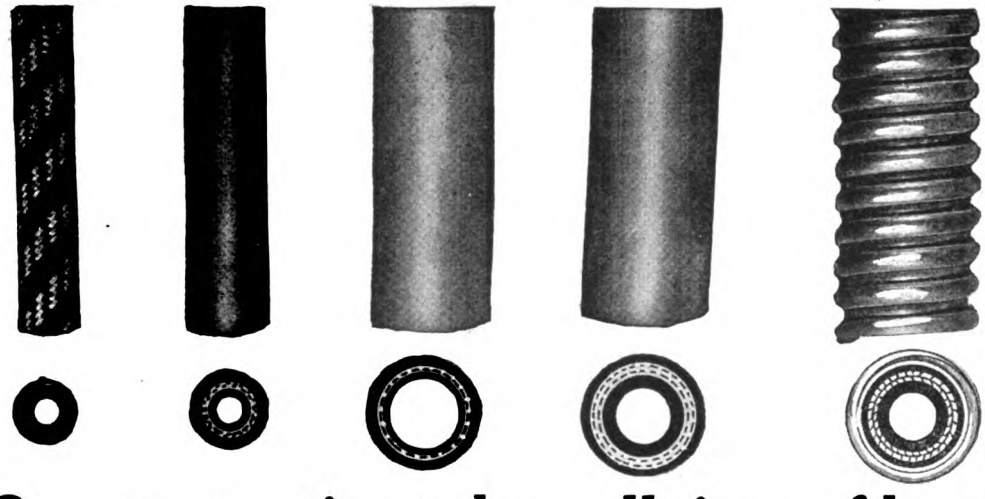
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Price
$1.25
Each

Here is a HOSE CONNECTION that is really a remarkable proposition

ROMORT



One connection takes *all* sizes of hose as illustrated, or any hose from $\frac{5}{16}$" to $\frac{3}{4}$" outside diameter, regardless of inside diameter

The connection at the other end is $\frac{1}{4}$" pipe thread and fits all Romort Automatic Air Valves or other connections with standard $\frac{1}{4}$" pipe thread.

A jobber with this one coupling in stock can meet all demands within those sizes, either plain, braided cover, or metal armored hose.

Made throughout of high duty brass, white nickel finish.

Factory Sales Representatives:
THE ZINKE COMPANY
1323 S. MICHIGAN AVE., CHICAGO, U. S. A.
Manufacturers:
ROMORT MFG. COMPANY
OAKFIELD, WIS. :: CHICAGO, ILL.

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Eliminate Hand Scraping and Reduce Bearing Fitting Time 90%

by means of

The Martell System of Aligning Reamers

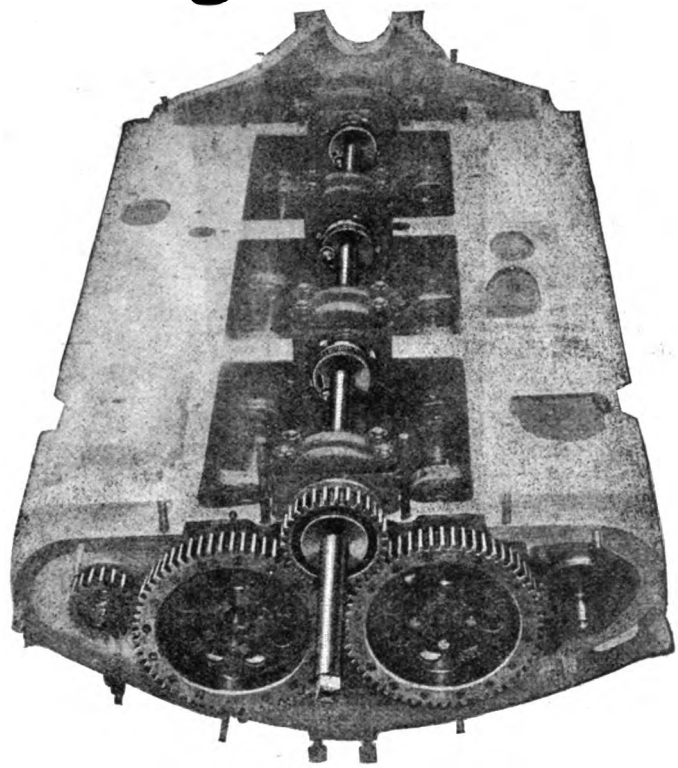
for Garage and Repair Stations

Insures—

Perfect alignment through all bearings—

Correct position of shaft in relation to other shafts or parts depending upon it for motion—

Correct size of bore of bearings allowing for oil clearance.



A Martell Aligning Reamer, showing the crank shaft gear mounted on a special bushing on the Reamer Baf to secure proper gear mesh.

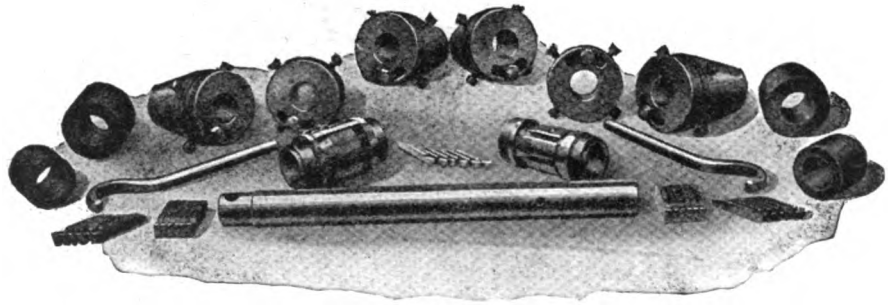
Meet us at Chicago Show, Space 39-40.
New York Show, Space 272-277.

Equipment No. 2

provides a range in diameters from 1⅝ in. to 2¼ in. inclusive.

A special equipment with rebabbitting fixture for Ford repair work.

Write for Descriptive Booklet 101-H and Price List



A Complete Martell Aligning Reamer No. 2 ready for shipment. This Reamer Shaft is not shown but is furnished.

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Honorably Discharged with An Admirable Record

Usaco AIR COMPRESSORS TRADE MARK

The USACO Two Stage De Luxe Automatic Air Unit.

Through inherent high quality alone this Compressor has commanded respect for years and found its way into a majority of the better garages, tire shops and filling stations. It is exceptionally quiet in operation, capable of delivering the highest pressure ever required and so constructed as to render service indefinitely.

Each season the De Luxe has grown in popularity but the changing conditions now apparent make the use of this unit not only more desirable but almost imperative. Tires are now in use of such size and pressure as were not even thought of two or three years ago. To meet these unusual conditions requires an **UNUSUAL** compressor. The De Luxe is the one ideal unit available. Send for literature and judge for yourself.

HAVING fulfilled our obligations to the Government in supplying hundreds of **USACO** Two Stage Automatic Air Compressors for war service here and abroad, our entire organization is again on a Peace basis, ready to afford the best of attention to regular requirements.

Being designed originally for the most severe service known, it was natural that **USACO** Two Stage Compressors should have passed the exacting tests and measured up to the high ideals of the War Department without change in design.

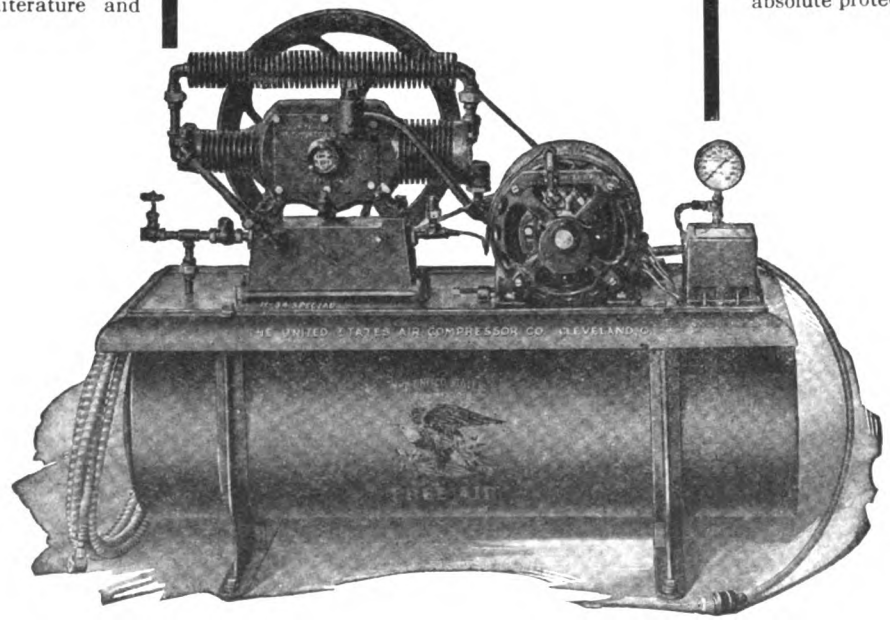
In war, seconds count—there is no time to await the slow, painful efforts of inefficient compressors. Under such conditions the tendency is to "under-inflate," with its high toll of tire destruction. By furnishing instant, high pressure service, **USACO** Two Stage Compressors avoided these serious features and undoubtedly saved thousands of dollars.

The USACO Line of Air Compressors.

The **USACO** Line of Air Compressors comprises different numbers in Two Stage and Single Stage types and various individual units adapted for forming combination of almost unlimited kinds and capacities.

Each machine is designed to fill a particular need and it will perform that service in a manner that is never excelled and seldom equalled.

The **USACO** Guarantee is the strongest ever applied to air compressors—and absolute protection to purchasers.



The United States Air Compressor Co.

6536 Carnegie Avenue **Cleveland, Ohio**

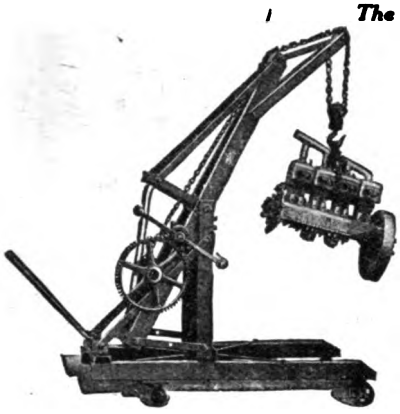
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MANLEY GARAGE EQUIPMENT

THE KEYNOTE TO EFFICIENCY AND INCREASED PROFITS

Manley General Utility Garage Crane

The Most Universal Garage Tool Ever Developed



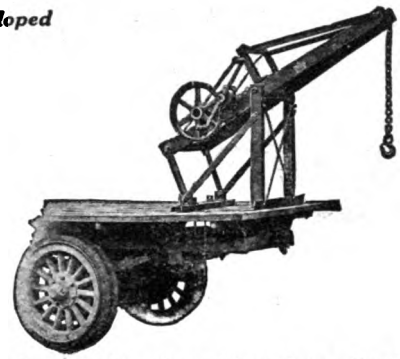
As a Portable Floor Crane for inside or outside uses
Capacity 1½ tons Price, $132.00

A half dozen different tools combined into one.

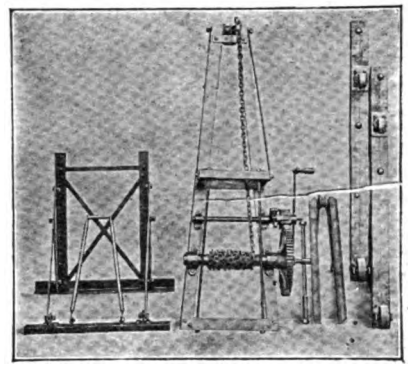
May be used for a hundred different purposes inside the Garage and outside in the country. May be mounted on a truck, chassis of service wagon for use as a general wrecking Crane.

Goes on and off a truck so easily and quickly it is not necessary to keep it tied up for this purpose only. If no truck is available, it may be taken apart and into the country to a wreck on a touring car.

It is taken down and put together again by two men in five minutes. Takes up no room when not in use.



As a Wrecking Crane Mounted on a Truck
Capacity 2 Tons Price, $112.00



May be used inside the Garage for every lifting operation and outside the Garage for wrecking purposes of all kinds. It therefore does double duty.

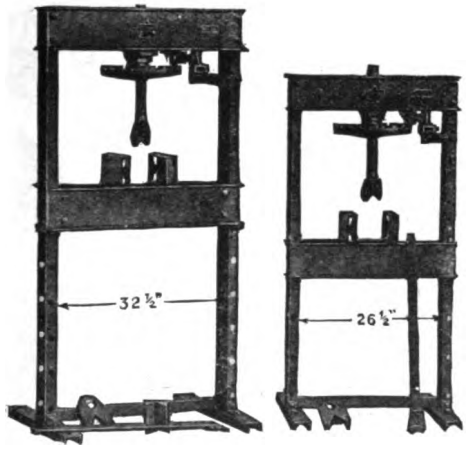
Any Garage using this Crane will get all the wrecking jobs. It will handle them as no other appliance can, five to ten times quicker. It is specialized for this work.

The biggest money making tool for the Garage on the market. Every operation performed by this Crane is one for which the Garage receives big money.

This Crane is constructed throughout of steel except the gearing which is cast iron and the base is seasoned white oak. It has four different leverages to suit all classes of work. The beam may also be tilted to any position from the horizontal to the vertical.

Lift as a floor crane 7 feet, overhang 36 inches, weight 485 lbs. Price, $132.00. Overhang as a wrecking crane 42 inches, weight 375 lbs. Price, $112.00.

MANLEY 22 TON PRESSES



No. 1 Garage Press Price, $98.00 No. 2 Garage Press Price, $82.00

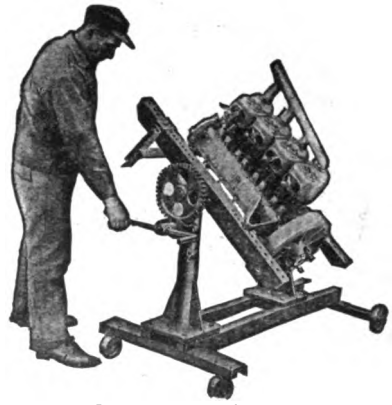
The Manley Line of Garage Presses consists of 4 different sizes making it possible for the Garageman to select a Press to exactly suit his class of work to the best advantage. These Presses have been highly developed and specialized for auto work and possess several exclusive features vitally necessary to handle this work to the best advantage in the shortest time and with the least effort. The two speed, quick change leverage is a tremendous advantage, the screw striking feature for extreme cases, the quick adjusting tables, the possibility to open the side bars to straighten chassis frames, the self-adjusting V Plate, etc., are also instantly appreciated by any Garage operator as real necessities.

MANLEY UNIVERSAL ENGINE STANDS

Plain Geared Stationary Portable

Large and Small

Ford Special Stand



Portable Geared Stand
Motor is Easily Revolved

In Repairing Engines it is only reasonable that every facility should be given to the workman so that he can work to the best advantage by having the motor properly supported so that he can turn it to any position in order to work on the various parts with the greatest ease in a perfectly natural position without cramping, without stooping and without danger. This is what the Manley Engine Stands were designed to do and is what they do with the highest degree of efficiency.

Also Portable Floor Cranes, Portable Work Benches and Oil Services

UNITED ENGINE & MFG. CO. - - - - - - - Hanover, Pa.

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SEE the New Links in the Chain of WEAVER Garage Equipment











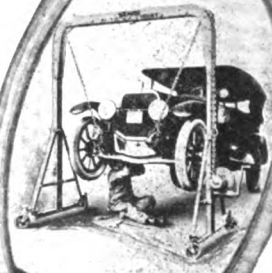


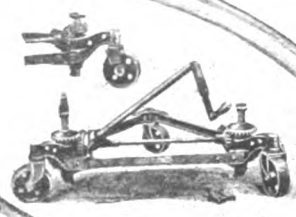
Two new Weaver Products will make their initial bow to the Automobile Industry of the country at

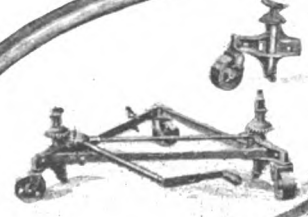
CHICAGO & NEW YORK AUTOMOBILE SHOWS

These new links will materially lengthen the powerful chain of Weaver Equipment which is fast binding the Garage Industry of the country to the "Largest Factory in the World devoted exclusively to Garage Equipment."









WEAVER MFG. COMPANY
2175-79 So. Ninth Street
Springfield, Ill.

"WEAVERIZE" YOUR SHOP FOR PROFITS

WRITE FOR COMPLETE CATALOG TODAY

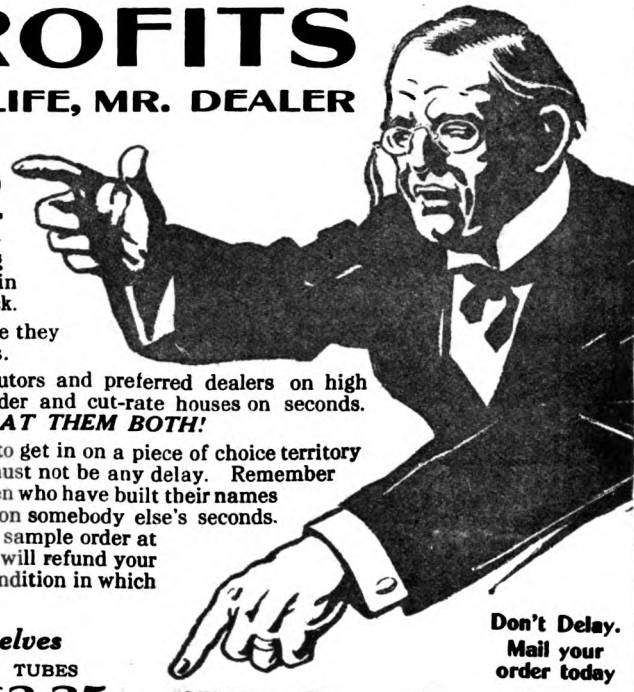
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BIGGER PROFITS

THAN YOU EVER GOT IN YOUR LIFE, MR. DEALER

—ON—

KIMBALL TIRES





If there's anything slower than molasses it's high priced tire sales—keeping your capital locked up tight, your business stalled, and the big clean profits others are packing away are nowhere in sight for you, just because you got on the wrong track.

KIMBALL TIRES give you the inside track because they are clean firsts at the prices others get for seconds.

You can't compete with factory branches, distributors and preferred dealers on high priced tires. You can't compete with the mail-order and cut-rate houses on seconds. ***SELL KIMBALL TIRES AND YOU CAN BEAT THEM BOTH!***

This is a big country and there is a chance for you to get in on a piece of choice territory yet if you will write us quickly—but there really must not be any delay. Remember this: all Kimball Dealers are prosperous business men who have built their names and reputations on "Kimball's Firsts" instead of on somebody else's seconds. They will tell you so. Get in touch with us. Send sample order at once. We guarantee our tires to be new firsts and will refund your money if tires are returned in three days in the condition in which they were received. Don't delay.

The Prices Speak for Themselves

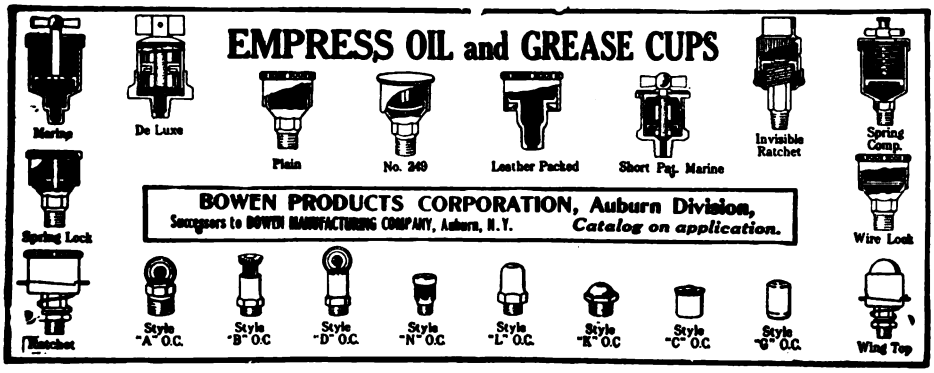
	NON-SKID	TUBES
30x3	$10.00	$2.25
30x3½	12.50	2.35
32x3½	14.25	2.55
32x4	18.55	3.20
33x4	19.55	3.30
34x4	21.50	3.40

Don't Delay. Mail your order today

The Kimball TIRE & RUBBER CO.

Dept. E, 2204 Michigan Ave., Chicago

EMPRESS OIL and GREASE CUPS



BOWEN PRODUCTS CORPORATION, Auburn Division,
Successors to BOWEN MANUFACTURING COMPANY, Auburn, N.Y. *Catalog on application.*

INLAND I-X-L PUMP

The Original Running Board Pump.

The MOST POWERFUL, COMPACT PUMP made and EASIEST OPERATED

Develops a leverage "18 times" the ordinary foot pump.

Cylinder is a SEAMLESS DRAWN STEEL SHELL REQUIRING NO PACKING.

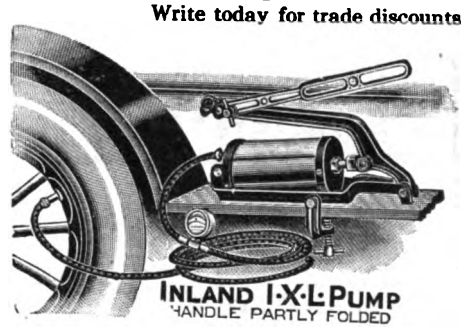
Material and construction the very best, assuring permanent service.

Quickly attached to either running board.

Folding handle and folding clamp. Size folded for tool box 3x4½ x 13½ inches.

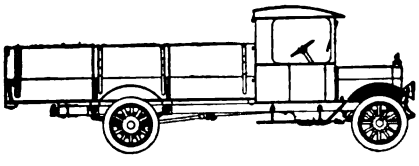
Price complete with hose - $6.00
Including gauge - - 7.00

Write today for trade discounts



INLAND PUMP MFG. CO.
609-612 Reaper Blk., Chicago, Ills.

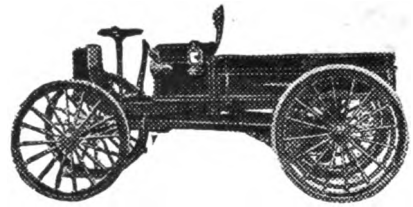
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We furnish all parts for making Motor Trucks and Truck Units.

Luverne Auto Co., Luverne, Minn.

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Ar more economic than others because they ar light, simpl, and carry more paying load in proportion to their weight. Prices $600 up. Catalog free.
DURYEA LABORATORIES, 18th St., Philadelphia, Pa.
Our Recording Thermometers ar also wonders.

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Subscribe to the "Automobile Dealer and Repairer," $1.00 Per Year.

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Ask us for co-operation on your selling plans and problems.

National Association of Automobile Accessory Jobbers
Wm. M. Webster, Commissioner
1920 City Hall Sq. Bldg., Chicago, Ill.

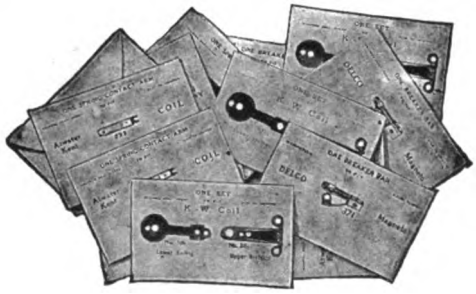
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"Grip Like a Mud Hook—Ride Like a Bare Tire"

WOODWORTH MFG. CORP., - Niagara Falls, N. Y.

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IGNITION PARTS and BRUSHES

On each Container is printed a full description of the part and a complete list giving cars on which the part or brush is used.

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EASY AND QUICK IDENTIFICATION. SAVING OF TIME AND TROUBLE.
FURNISHED AT NO ADDITIONAL COST.

Our Display Case and Stock Cabinet (furnished free with moderate order) helps to sell goods and keeps stock in perfect order.

1919 CATALOGUE—Sent Free—A Complete Guide to Ignition and Starter Work.

OTTER MANUFACTURING CO., Inc.,
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NEW MATERIAL for IMMEDIATE DELIVERY

Westinghouse 6-volt systems, consisting of No. 700 Frame Starter, with Starting Switch, and No. 400 Frame Generator, with Regulator Cutout. Per set, complete as above	$42.50
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Stromberg Carburetors, Model H-4	19.00
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Better quotations in quantities. We sell for cash only to the trade.
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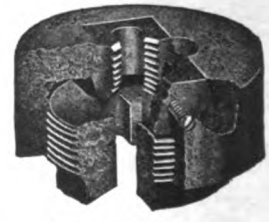
A Pointer

Poor tools or lack of tools is the greatest hindrance the repairman has. The novice with an assortment of good tools can accomplish more.

No garage equipment is complete without a G T D Screw Plate. Not only will it recut jammed threads, but new threaded parts can be made—and it's mighty hard to get spare parts now-a-days.

G T D Screw Plates are made in over a hundred assortments. Yours is among them.

Write for New Small Tools Catalog No. 40, describing Screw Plates, Taps, Dies, Reamers, etc.



Little Giant Die, Guide and Collet



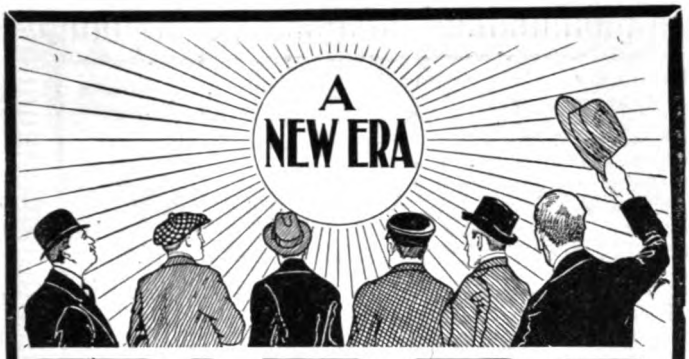
Little Giant Die

Greenfield Tap and Die Corporation
Greenfield, Massachusetts

New York, 28 Warren St. Chicago, 13 So. Clinton St. Detroit Office, 74 Congress St., W.
Canadian Plant ..... Wells Brothers Company of Canada, Ltd., Galt, Ontario

Buy a G T D Screw Plate
With
Little Giant Adjustable Reversible Dies

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TIRES
SELECTED BLEMISHED

MAKE 1919 a banner year in the way of profits—handling tires in selected blemished stock, popularly known as "Seconds." We sell them at 40 to 60% off lists. Your profits are easily 25 to 40% on your investment.

Who can handle these tires? Machinists—Repair Shops—Accessory Stores—Tire Shops—Vulcanizing Shops—Hardware Shops—General Stores,—etc.

Is it a desirable business? Yes! emphatically so! since about 75% of our retail business is repeat business. You will find it the same in your case.

How much do I need to start? Anywhere from $100 and up according to locality. And the money should be turned over five to seven times.

Do I need any special knowledge of tires? No. With each initial order of $100 or more we shall be glad to send gratis a book showing list prices, description, and vital information of all tires manufactured.

Please address us for more detailed information and stock lists, on your letterhead.

JANDORF AUTO CO., Inc.
TIRE JOBBERS
1759 Broadway Est. 1899 New York



BEACH

"Wallop" your rim with a hammer to force it in or out of place and you are bound to have greater trouble next time.

Do The Sensible Thing

Provide yourself with the best rim tool on the market and save time, trouble and rims. With the

Beach Rim Tool

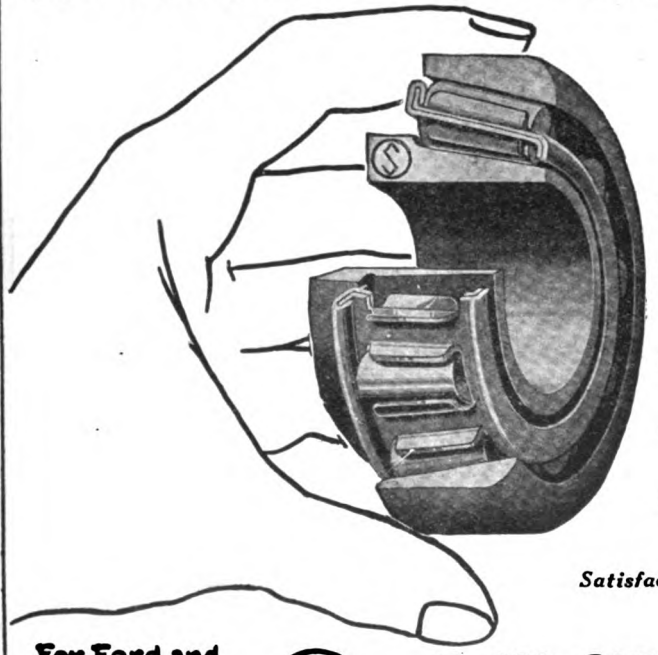
You can quickly expand or contract any make of cross-split demountable rim—the Beach is universal and takes them all.

Ten Days' Trial If your dealer or jobber does not have them, we will send you one. Try it for ten days. If not satisfactory, return it to us and we will refund your money.

JOBBERS AND DEALERS, Get Our Proposition
We also make the Beach Automatic Grip wheel puller

THE GREB CO., 197 STATE STREET, BOSTON, MASS.
"Look for These Tools at the Automobile Shows"

The mechanical superiority of the
F.W.S. Roller Bearing makes them
"First Choice"



All of the good features which a roller bearing should have are incorporated in the design of the F. W. S. Bearing. These are the features which mean better service and longer service in the F. W. S. improved retainer:

PERFECT ALIGNMENT OF ROLLERS—Broad-wings of Cage provide broad and smooth surface against rollers, so rollers cannot get out of line.

EXTRA STRENGTH—Strong Cage is secured by double walls of high carbon steel, outer edge reinforced by turned edge, giving three thicknesses at that point.

EQUAL BEARING SURFACE—Due to the double walls of retainer having equal wings on each side of rollers.

LUBRICATION—The wings provide pockets to retain the grease, but accumulated dirt cannot pack in around the rollers.

CONES AND RINGS made of especially prepared steel properly tempered and ground to absolute accuracy in size and contour.

Satisfaction Guaranteed. Dealers and Garagemen Write for Further Particulars

For Ford and Chevrolet front wheels

F. W STEWART
1404 Michigan Ave. CHICAGO

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New York Automobile Show

THE BIG SHOW, IN TWO BUILDINGS, FOR TWO WEEKS

Madison Square Garden and 69th Regiment Armory

(BOTH BUILDINGS WITHIN A STONE'S THROW OF EACH OTHER)

Feb. 1-8—For Passenger Cars.

Feb. 10-15 — For Commercial Vehicles, Tractors, Trailers, Bodies, Etc.

Admission to enter Show (two buildings) 50 cents.

Accessories and Parts will be Exhibited during both weeks in Both Buildings.

No Motor Car Owner, dealer or manufacturer can afford to miss this biggest of Automobile Shows.

Automobile Dealers Association of New York

INCORPORATED

206 West 55th St. (near Broadway) New York City

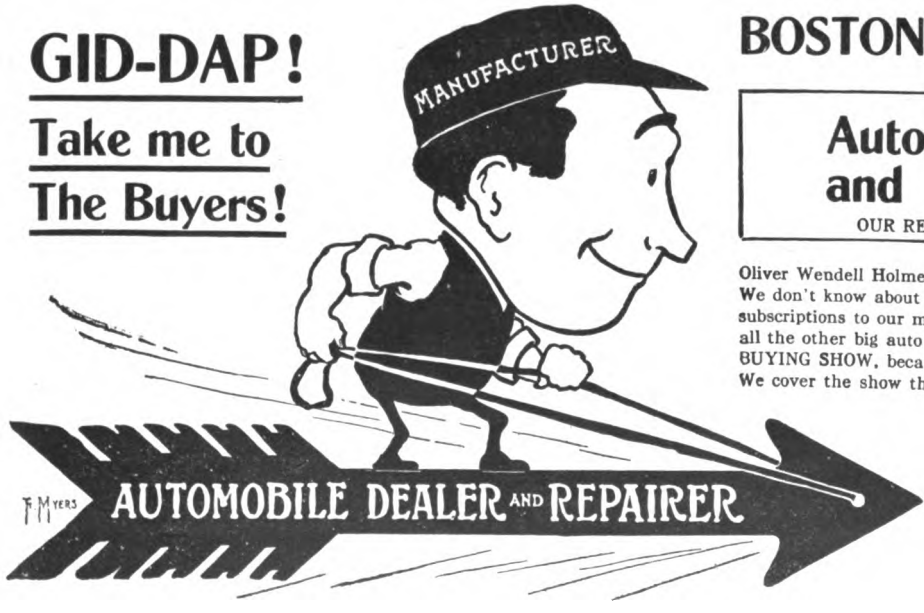
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THAT YOU HAVE A SURE WINNER

But you cannot expect to make sales without Advertising! It will pay you to have a good Announcement, preferably at least a full page in the

GID-DAP!

Take me to The Buyers!



BOSTON SHOW NUMBER

OF THE

Automobile Dealer and Repairer

OUR REGULAR FEBRUARY 1919 ISSUE

Oliver Wendell Holmes once called Boston the Hub of the Universe. We don't know about that, but we do know that we took more paid subscriptions to our magazine at the Boston Show of 1918 than in all the other big auto shows put together. The Boston Show is a BUYING SHOW, because it is held in the SPRING.

We cover the show thoroughly, almost dominate it, in fact, in a very prominent booth.

Are you with us? Better get on the Band Wagon!

Regular Rates. Write or Wire NOW for price and space reservations.

Final forms close February 5th.

Our Slogan: "Famous for Producing Tangible Results"

MOTOR VEHICLE PUBLISHING CO., 71-73 Murray St., New York City

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HALLADAY BUMPERS AUTOMOBILE ACCESSORIES

AND

HALLADAY HELPS FOR FORD CARS

Our line for 1919 is complete, including Bumpers, Shock Absorbers, Flexlevers, Tilting Steering Wheels, and the latest conveniences in car and garage equipment.

Our 1919 catalog is now ready and should be carefully read by every jobber in automobile accessories.

If you have not secured yours, write us, we will do the rest.

L. P. Halladay Company, Streator, Illinois.



STUDY THIS JOINT

The complete ring shows the joint partly open; the section within shows the joint closed.

You can readily see how this joint with its perfect sealing ability will prevent compression loss and the passing of lubricating oil into the combustion chamber.

If you want satisfied customers, install GILL PISTON RINGS in the cars which you repair and overhaul.

Ask your jobber for GILL PISTON RINGS or write us for details.

Gill Manufacturing Company, 351 W. 59th St., Chicago, Illinois.

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National Needs

have made curtailment of rubber imports necessary. Already the excess of demand over supply has caused an increase in tire prices—other increases are imminent.

It's Time Now for Economy

If your heart is in this war, you will clearly see the need of getting the last fraction of a mile out of your tires. You can do so by coupling your patriotism up with

National Tire Filler



Motorists Have No Tire Trouble Who Ride on This Perfect Substitute for Air

Rim-cut-proof, blowout-proof, puncture-proof tires are now a reality. Motoring is now freed from the shackles of tire trouble, and is made safe, comfortable and enjoyable.

National Rubber Tire Filler replaces the inner tube. It has all the resiliency of an air-filled tire with none of its disadvantages. It lasts indefinitely—40,000 miles or more. It has been in use for five years and has conclusively proven its superiority and economy over air-filled tires. Our factory taxed to capacity is proof positive of its great popularity.

It rides as easy as air.
It cannot puncture or blowout.
It can be used in all style tires.
It can be installed on all makes of rims.
It doubles tire mileage.
It is easily installed.
It stimulates motoring.

National Rubber Filler Co.

208 College Street **Midlothian, Texas**

With the arrival of

Superford HONEYCOMB RADIATORS



For Ford Pleasure and Commercial Cars, the Ford dealer is now assured of a high-class radiator, carefully constructed, that will render service efficiently and greatly improve the operation of the motor.

"Superford" Radiator Units are made entirely of brass

Model No. 16-F
For 1909 to 1916 Ford Cars. Made like the 1918 in two units with black detachable casing.
Price each, $30.00

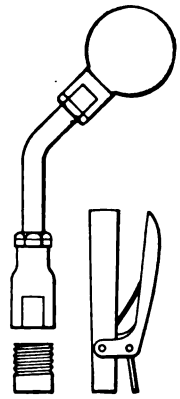
Model No. 18-F
For 1917-1918 Ford Cars, made in two units, with black detachable casing.
Price each, $35.00

Catalogue No. 6 now ready. *Write for proposition.*

SUPERIOR LAMP MFG. CO.
136 West 52nd St., New York, U. S. A.

MELLIN'S GEAR-SHIFT EXTENSION

(Adjustable)



The *easy selling* acccessory that brings the shift-lever to just the *convenient* position for each driver. Over 25,000 are in use. Dodge, Overland 75-90, Nash, list $1.25. Buick, Reo, Oakland, and all cars having removable ball on top lever, list $1.50. Hudson Super-six, Overland 85, and all cars where ball is not removable and the extension clamps on, list $2.00. When ordering, give name and model of car. All goods shipped charges prepaid.

AT YOUR JOBBER'S





M. & H. NOVELTY CO., 857 E. 24th St., Los Angeles, Cal.

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"Stolen!"



F.O.B.

COMBINATION AUTO

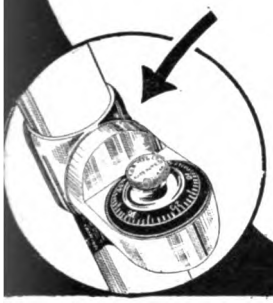
LOCK

Can be sold by Automobile Dealers and Garage men because

1st.—When shown the car owner, he appreciates immediately why the lock makes his car thief proof.

2nd.—Every car owner needs a lock, but knows a thief can pick a key lock with a hairpin. He has been waiting for a practical combination lock, and here it is.

3rd.—The F. O. B. Mfg. Co. guarantees the lock to last longer than the car. Besides making the car thief proof, the lock itself is fully guaranteed.



Call at our booth at the New York Show from Feb. 1st to Feb. 8th and convince yourself of the F.O.B. Lock's superiority over any lock you ever saw.

THE F. O. B. MFG. CO.

Real Estate Trust Bldg., Philadelphia.

BEACH GRIP AUTOMATIC PULLER

The One Best Bet in a Wheel and Gear Puller



Make Your Gear and Wheel Pulling Show a Profit.

A ONE-MAN PULLER

Quick acting, strong, and simple in the extreme. This positive grip is a garage necessity that is worth its weight in gold. It adjusts to work instantly and can be locked in any desired position.

Ten Days' Trial

If your dealer or jobber does not have them, we will send you one. Try it ten days. If not satisfactory, return it to us and we will refund your money.

Jobbers and Dealers, Get our Proposition

We Also Make the Beach Rim Tool

THE GREB COMPANY, 197 STATE ST. BOSTON, MASS.

Look for these tools at the Automobile Shows

ASK YOUR JOBBER

For Your Battery Shop Supplies

Your jobber is in business for *your* benefit. While he makes a small profit on the goods he sells, he saves you far more in time, worry and money. He hunts out and purchases the very best in every line—and keeps it ready to deliver to you on your orders. You never need to search the country over for supplies or repair parts—if you depend on your jobber.

As all new devices and wares must satisfy his rigid tests before he offers them to you, all your purchases from him bear his endorsement as well as that of the maker.

AMBU CADMIUM TEST OUTFIT. To test both sets of plates in the storage battery without taking it down. This is proving one of the greatest labor savers — time savers — and battery savers ever offered to the repair man. Consists of specially calibrated and voltmeter with the indicated correct readings shown on the dial in red. A pair of rubber tipped cadmium leads to reach the different plates. Packed in convenient cases with complete instructions. Outfit complete $25.00. Voltmeter only, $22.50. Cadmium only, $3.00.

AMBU BATTERY STEAMER. Softens compound in battery in 15 min. without danger of injury to jar or connections. Needs no attention—Works while you are busy. Price complete $25.00.



AMBU BATTERY PLATE PRESS. To press and strain plates. One of the most valuable "salvage" devices in any shop. $32.50.

AMBU PLATE BURNING RACK. To hold battery plates in position while burning in new ones. Great time saver. $7.50.

AMBU LEAD MOLDS. For molding into convenient usable form lead scrap and trimmings. Most shops need several. Each $1.75, $3.25.

AMBU WIRING DIAGRAMS. All the 1917 and 1918 cars' electrical systems diagrammed. Book of over 300 for $3.50. Single sheet diagrams of older models, 25 cents each.

"AUTO STORAGE BATTERY." A book that tells in simple language all about the care and repair of storage batteries. $5.00.

Your Jobber Should Have These In Stock. If he cannot supply you write direct to

AMERICAN BUREAU OF ENGINEERING, 1025 Wabash Avenue, CHICAGO.

Makers of the famous AMBU Electric Trouble Shooter.

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MR. BLACKSMITH



MR. MANUFACTURER

Yes—I'm a Country Blacksmith, and because of that I am compelled to put on my hat and coat and go up to the city to buy my Auto Accessories—I never see your salesmen.

If you advertised your product in my Trade Journal, The Blacksmith and Wheelwright, I could buy from you direct. It would save ***you*** time and extra expense and ***me*** too!

Fill out the coupon and send it to

Bill Wise

We Wanta Know!

Is it true that the Country Blacksmiths must leave their work and go to the nearest city to buy Auto Accessories? How can I sell these men my product?

We are makers of_____

BILL WISE
P. O. Box 654
New York, N. Y.

Name _____
St. address_____
City_____ State_____

VISITORS TO
THE NEW YORK
AUTOMOBILE SHOW

Should be sure to see the big CHASE EXHIBIT—of interest to all dealers or manufacturers.

The Exhibit Will Include the following Famous

CHASE

PRODUCTS

CHASE
Leatherwove
"Tis like the hide in most respects
In some respects tis better"

Made by Sanford Mills

A specific upholstery fabric which meets every requirement of motor car use.

CHASE
MOHAIR VELVETS

Made by Sanford Mills

The luxurious closed car upholstery fabrics—comfort, beauty, durability.

CHASE
DREDNAUT
Motor
Topping

"Defies Time and The Elements."

CHASE
Robes

Made by Sanford Mills

Robes for every occasion—Wool, Cloth, and the famous Chase *Plush* Robes—also a full line of Steamer Rugs.

There will be also a Special Display of Motor Coats mad of Chase Furwove.

Don't fail to inquire for the location of this Exhibit—a visit will pay you!

L. C. CHASE & CO.: BOSTON

New York Detroit San Francisco Chicago

Leaders in Manufacturing Since 1847

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ENDURA

THE TRUE SERVICE PACKING



No motor engine is fit for service unless the several parts which are bolted together are properly packed.

The packing that will absolutely insure a tight joint and keep the motor free from gasoline and oil leakage is ENDURA.



This advertisement is placed before you to enable you to understand that ENDURA PACKING is made for service. Why not give your customers the benefit of this wonderful service by using ENDURA PACKING on all repair work in the future?

Write us for the address of our nearest agent.

THE ENDURA MANUFACTURING CO.

63rd St. and Eastwick Ave., Philadelphia, Pa.
45 Lafayette Street, - - New York City

Agents in all principal Cities from Coast to Coast

SERVICE STATIONS AND GARAGEMEN!

Big Worth-while Profits, With Astonishing Increase of Trade, Immediately Follow Your Taking on

NEW YORK REPLACEMENT IGNITION COILS

95% of All Cars Are Coil Equipped—Every One a Prospect

No Large Investment Necessary

A Few Dollars Will Start You, Because a Small Quantity of Different Model Coils Fit ALL CARS

FIFTEEN YEARS COIL BUILDING EXPERIENCE

enables us to produce a coil that gives a "crashing big hot spark" even when battery is low, that insures easy starting and perfect running on present-day low grade gas.

They Are Guaranteed for the Life of the Car

Don't let your competitor get the nicest piece of business ever offered, *but write today* for trade prices and circular giving list of proper coil for each model car.

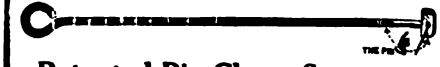


NEW YORK COIL COMPANY, 338 PEARL STREET, NEW YORK, N. Y.

Mid-West Distributors: GRAY-HEATH CO., 1440 Michigan Avenue, Chicago, Illinois

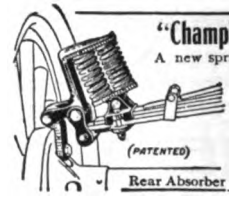
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FAWSCO
Improved Combination
Oil Cock Wrench & Cleaner
—AND—
Gasoline Gauge



Patented Pin Clears Stoppage
45c *Ask Your Jobber or Write*
J. H. FAW, Inc.
37 Warren Street New York City

ADAMSON
Vulcanizers
ADAMSON MFG. CO., East Palestine, O.



"Champion" SHOCK ABSORBERS For Ford Cars
A new spring suspension which absorbs jar and rebound. A wonderful E-Z ride suspension. (E-Z to attach.) Guaranteed by mfrs. Exclusive sales; big profit; agents.
CHAMPION SHOCK ABSORBER SALES CO., Inc.
Dept. K, Indianapolis, Ind., Mfrs.
(PATENTED) Rear Absorber

THE SUNDERMAN VACUUM CARBURETOR
positively saves from 30% to 50% of your gasoline.
Increased mileage on a Ford car 128% in the New York Herald's recent test on the Sheepshead Bay Speedway. Splendid dealer's proposition.
SUNDERMAN CORPORATION
13 Chambers Street, Newburgh, New York

A National Cash Register and the N. C. R. Credit File will give you complete control of your business.



BALL AND ROLLER
BEARINGS
ALL TYPES — IN STOCK — MANY SIZES
THE GWILLIAM COMPANY
ENGINEERS
253 W. 58th St. (at Broadway) NEW YORK
Branch: 1314 Arch St., Philadelphia

STEER WARMS
Keep the Hands Warm
in winter driving. Cost but little; and no expense to maintain; guaranteed for 5 years. Progressive dealers find that Steer Warms are great business boosters. Write for terms Interstate Electric Co., Dept. 135, New Orleans—sole manufacturers of Steer Warms.

LYKNU POLISH
WILL MAKE YOUR AUTOMOBILE JUST LIKE NEW

IMPERIAL WELDING CUTTING EQUIPMENT
OXY-ACETYLENE PROCESS
Catalog and prices on request.
IMPERIAL BRASS MFG. COMPANY
520 So. Racine Avenue Chicago

HIGGINS QUALITY SPRINGS—For Replacement
No hole. No Bolt. No hump. No jolt. No center breakage. Guaranteed alike: t all points. Out-serve and out-sell all others. Immediate shipment.
Write for Catalogue C-1917



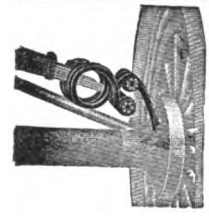
and Dealers Discounts.
Higgins Spring & Axle Co.
Dept. 114 Racine, Wis.

BEARINGS
Ball and Roller
Any type Any size Standard makes
COLUMBUS SALES CO.
1777-1779 Broadway New York.

STENMAN ELECTRIC VALVE GRINDER
THE STENMAN ELECTRIC VALVE GRINDER CO., Inc.
42 Southbridge Street WORCESTER, MASS.



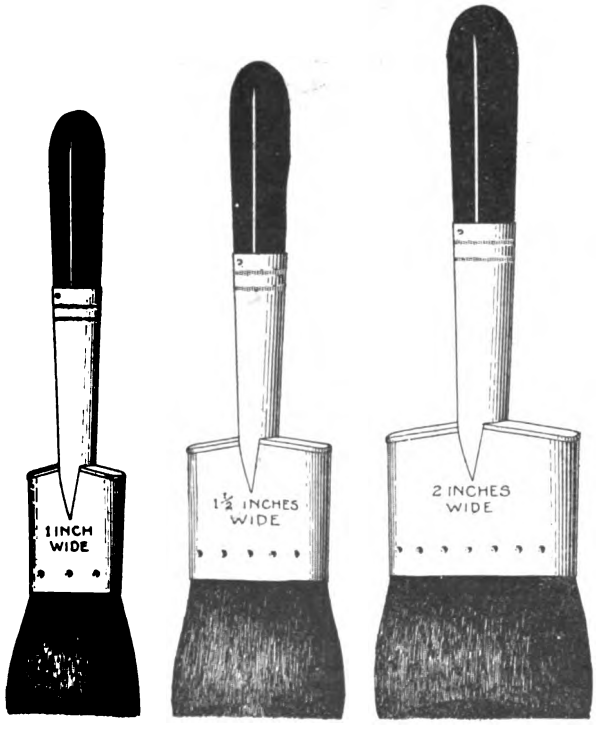
"UNIVERSAL" Extension Pedal
One model for all styles and shapes of clutch and brake pedals.
Price with rubber pads $5.00
Plain $4.00 per pair.
RICH MFG. CO.
1777 Broadway, New York



Twin Spring
SHOCK ABSORBER
BEST BY TEST
For Ford, Maxwell, Studebaker, Pierce Arrow and All Cars.
Write for Agents Proposition and Prices
TWIN SPRING CO.,
61 Belvidere St., Boston, Mass.

IMPORTANT POINTS ABOUT PAINT AND VARNISH BRUSHES

A Set of Three Brushes and the Automobile Dealer and Repairer for One Year for $2.00.



Showing Brushes One-Half Actual Size.

Did it ever occur to you that there was much difference between a good paint or varnish brush and a poor one? Probably not. To most people a brush is just a brush Yet an analysis shows that there is an almost measureless difference between a good brush and poor one.

For instance, a properly made Flowing Fitch brush is hermetically sealed, so as to keep the paint, or whatever may be used, from getting into the brush at the top and loosening the hairs. All such properly made brushes are solidly set in glue cement inside a leak-proof ferrule, and a whole row of neatly clinched nails are driven in at the end of the ferrule to give added security, and a guarantee that the hairs will not pull out.

A Fitch brush is *smooth*, *soft*, and *flowing*, and does not "mush" up or get flabby like a cheap brush, but holds its springiness. The trouble with cheap brushes is that the ferrule is nothing more than a single band of tin, open at the top, with a couple of nails jabbed through. When you use such a brush the cheap hair will pull out and scatter all over your work, because it is not held securely enough to stand the drag of the brush in painting or varnishing.

A brush may be washed with gasoline or kerosene oil, but to clean it thoroughly turpentine should be used. No brush used for painting should be used for varnishing.

We have recently made arrangements with one of the best manufacturers of these properly made brushes in New York to offer a set of Three in connection with a subscription to the AUTOMOBILE DEALER AND REPAIRER for a year for an even $2.00, except in the 7th and 8th zones the price is $3.00, the subscription rate being $2.00 for a year. These zones comprise the following states: Arizona, California, Colorado, Idaho, Kansas, Montana, Nebraska, Nevada, New Mexico, North Dakota, South Dakota, Oklahoma, Oregon, Utah, Washington and Wyoming; also Canal Zone, Guam, Hawaii and Porto Rico, Samoa, Virgin Islands. These brushes sell at retail for $1.40. It will be seen, therefore, that there is a substantial advantage in sending to us for the AUTOMOBILE DEALER AND REPAIRER for a year, and for a set of these brushes.

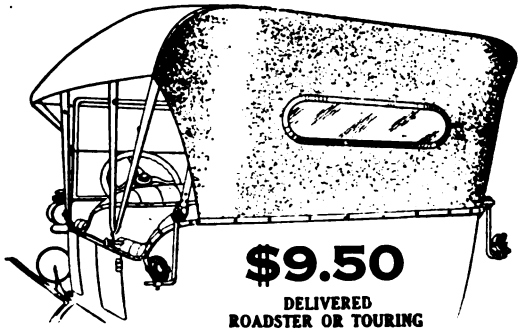
Present subscribers can have their subscriptions extended for a year, and secure a set of brushes, on the same terms. These brushes are guaranteed in every respect, and though they cost more than cheap brushes would cost, they are far cheaper in the end, because of their lasting qualities and the good work that can be done with them. No man can afford to waste expensive paint and varnish on any vehicle by using a cheap and poorly constructed brush, such as is usually to be found wherever brushes are sold. The ordinary dealer in brushes himself as a rule has very little knowledge of the quality of the brushes he sells.

Remit by check or money order, and your name will be entered as a subscriber to the AUTOMOBILE DEALER AND REPAIRER for a year, and a set of these brushes, which are just the right size and shape (see illustration, which is exactly one-half the actual size of the brushes,) will be sent to you, postage prepaid.

Address all orders to

MOTOR VEHICLE PUBLISHING CO.
Publishers of the Automobile Dealer and Repairer
71-73 MURRAY STREET NEW YORK

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$9.50
DELIVERED
ROADSTER OR TOURING

BEVEL GLASS FORD CURTAIN

Ready for Anyone to Attach

Eliminates discolored and broken out old-fashioned celluloid. The 6x26 clear vision bevel glass enables you to see the entire width of the road behind and avoid accidents. It adds class and style to the appearance of your car.

ECONOMICAL, having three thicknesses of standard Ford material. Makes it practically indestructible and the weight of the glass is carried in an ingenious manner. We guarantee and insure this frame against pulling from the goods.

The complete outfit to entirely replace old back curtain, standard Ford material, is $9.50 prepaid to any P. O. in the U. S.

Send cash with order or $1.00 deposit and we will ship, balance C. O. D., Parcel Post.

We supply this light in any size Curtain for any make car, in any grade of goods. Prices upon application.

SUBSTANTIAL DISCOUNT TO BONA FIDE DEALERS AND LARGE USERS.

C. MARVILLE DWYER
Manufacturer and Jobber
AUTO TOP AND BODY SUPPLIES
116 West Washington St., Los Angeles, Cal.

Profits in HB Battery Charging

The demand for service in recharging auto storage batteries is constantly increasing. There are big profits for you all the year round, but cold weather, heavy starting service and excessive use of lights makes battery charging profits run highest when other business runs low. Other garages, with no better opportunity than you, are clearing

$100 to $150 Extra Profit Every Month

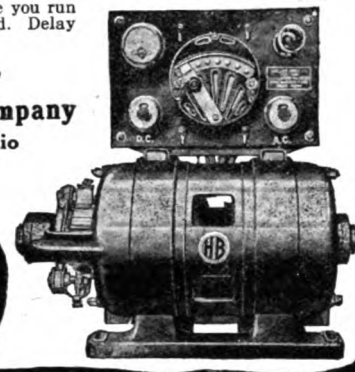
Some are doing even better than this. What you can make depends entirely upon yourself. This HB 500-watt Charger will recharge from 1 to 7 batteries at once, with current cost of only 12c to 15c per battery. Autoist pays 75c to $1.50. Anyone can operate. No electrical or mechanical experience necessary. Will recharge any make or size storage battery quickly, successfully and profitably.

$15 Puts This Money-Maker in Your Garage

Balance in 9 monthly payments of $20 each, which earnings should easily pay, with big profits besides. Write for full particulars or send $15, first payment, with trial order. Under absolute money-back guarantee you run no risk in ordering from this ad. Delay simply means lost profits.

Write or Wire Today

Hobart Brothers Company
Box D-1, Troy, Ohio



One Garage is averaging more than $200.00 a month

Install a Curtis Air Compressor

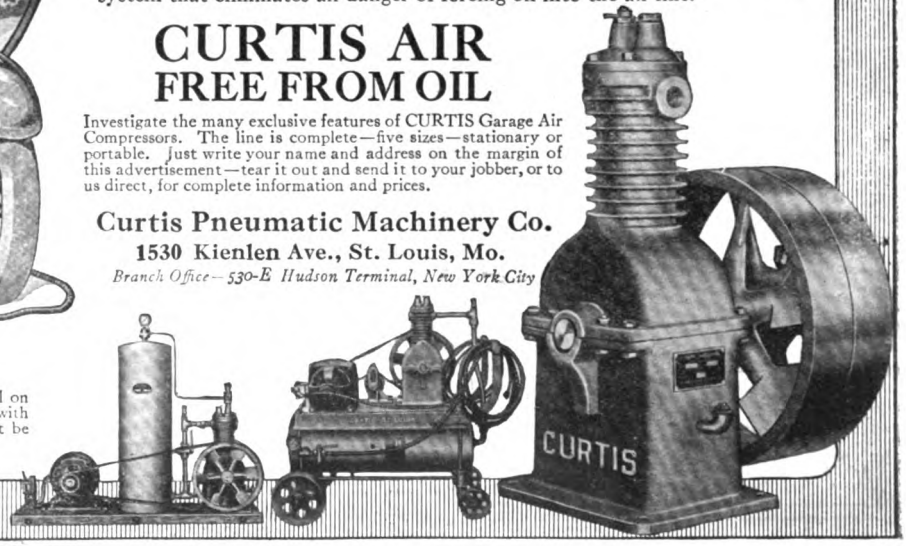


Display a CURTIS "FREE AIR" SIGN above your door—it inspires confidence and will help build your business. Motorists are looking for this familiar CURTIS slogan—because they know oil rots tires—and that a CURTIS Air Compressor furnishes AIR FREE FROM OIL, which means fewer blowouts, greater tire mileage and less repairs. The CURTIS is the ONLY Garage Air Compressor with the controlled splash oiling system that eliminates all danger of forcing oil into the air line.

CURTIS AIR
FREE FROM OIL

Investigate the many exclusive features of CURTIS Garage Air Compressors. The line is complete—five sizes—stationary or portable. Just write your name and address on the margin of this advertisement—tear it out and send it to your jobber, or to us direct, for complete information and prices.

Curtis Pneumatic Machinery Co.
1530 Kienlen Ave., St. Louis, Mo.
Branch Office—530-E Hudson Terminal, New York City



The Curtis Sign

Illustrated above—is 10x14 inches—baked enamel on steel. Cannot be bought, but is furnished FREE with every CURTIS Garage Air Compressor—and cannot be had in any other way.

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WE TRAIN YOU

TO BE AN EXPERT TIRE REPAIRMAN



A BUSINESS OF BIG PROFIT FOR YOU.

The tire repairing business is one of the most profitable in the automobile industry. A large investment in equipment is not necessary, while a large and quick turnover is assured. There never was a time when tire repairing was as important as it is today, and never before have experienced repairmen been so scarce.

We Help You Develop A Profitable Tire Repairing Business

Through our course on tire repairing and shop management we give you expert training on all the problems of tire repairing, vulcanizing, and the administration of your business affairs. Our course goes right to you in your home, where you will not lose valuable time away from your work. It is the most complete, inexpensive, and practical tire repairing course in existence. We guarantee to train you to be an expert tire repairman in three months so that you can repair fabric tires, all makes of cord tires, big pneumatic truck tires and tubes.

We show you every operation in making repairs. Every point is explained and make clear with drawings and photographic reproductions. We show you how and where to get the best equipment for doing the work, how to operate a shop on the most economical basis, and how to advertise and develop a highly profitable business. Write today for free folder T3.

The Hovey Extension School Company, Inc., 312 Second National Bldg., Akron, O.

PLEASED?

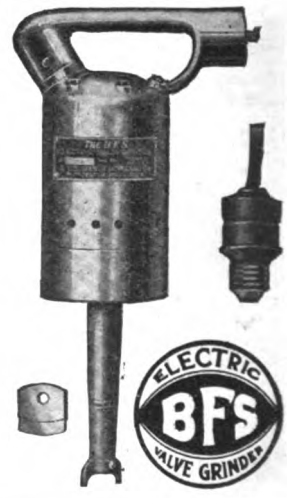


WHY OF COURSE HE'S PLEASED WITH

B·F·S·

VALVE GRINDER

You too will be pleased—it's a better way of grinding valves—it's quicker and more uniform results are obtained. Hand valve grinding is a slow, tiresome, tedious, money losing job—naturally, it's out of date—a thing of the past.



It took some years for The B. F. S. Grinder to arrive at its present state of perfection. In operation, the familiar oscillating motion employed in hand grinding is followed, but at a speed not attainable by the hand method. 800 to 900 oscillations per minute are developed.

Rear valves on Ford motors are reached with ease without special attachments. Tiresome jobs, if they can be done quickly, become a pleasure—and that is why B. F. S. is bound to please.

It meets the strain of continual usage in the hands of the average garage employee.

Yes—it is true, you can walk to Chicago—but you get there quicker if you go by train. Same difference between hand valve grinding and the B. F. S. System.

GET A GRINDER THAT WILL PLEASE. *Write for full particulars.*

MANUFACTURED BY

B. F. S. MANUFACTURING CO., 54 Hermon St., Worcester, Mass.

20th CENTURY'S No. 6 SELF-VULCANIZING PATCH



This new idea in Patch construction eliminates every possibility of an imperfect tube repair—and the man who looks at an idea to see if he can use it, and not to see if he can get along without it, is the man who wins out every time.

This Patch is Guaranteed Not to Loosen, Leak, Creep or Blow Out. Absolute Satisfaction or Money Refunded

MADE IN 3 SIZES

2¼x16—36 Square Inches, 50 Cents 4x15—60 Square Inches, 75 Cents

6½x20—130 Square Inches, $1.50

If not found with your JOBBER or DEALER, write to us direct.

20th CENTURY TIRE PROTECTOR CO., MIDLOTHIAN, TEXAS

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MAGIC RUBBER MEND

IT REPAIRS RUBBER LIKE MAGIC!



Stick it on like a postage stamp and the air does the rest.

When you use it you forget everything else.

The Red Cross
The Army
The Navy
The Gas Mask
The Post Offices
The Armies of Europe

All use it. Why? It can't be beaten.

Special Proposition to Dealers

It's a 100% Article

Booth 323-324 Madison Square Garden Auto Show

EASTERN RUBBER CO., 1529 Ridge Ave., Philadelphia, Pa.

KNOWLSON'S SPRING SPREADERS

100% Easier Riding

Both Guaranteed

Either or Both Delivered Upon Receipt of Price

This one Drop Forged, nickel plated and polished.

Price, $1.75





Fit Any Spring Easily Operated
Strong and Durable

Don't ruin your Springs by neglecting them

There is but one effective way to take care of them

Get a Knowlson Spreader

At your Dealer's or sent direct

Squeaking Stopped

Your Money Back If You Want It

This one Drop Forged; Yoke, gun metal finish. Screw and handle nickel.

Price, $1.25





YES—THEY'RE BUYING!!!

Write or Telegraph Today

SPRING LEAF LUBRICATOR CO.

1000 FOREST AVENUE -:- ANN ARBOR, MICH.

One Jolt of a Rusty, Squeaky Spring May Cost You Ten Times the Price of a Sure Preventive



Cylinder Regrinding Pistons Pins Rings

BUTLER MFG. CO.

1124 E. Georgia Indianapolis

Standard Prices Send your Work Now

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KEEP THE PROFITS COMING IN

by establishing a complete department in your business for

TIRE AND TUBE REPAIRING

Hold the tire business of your present customers and win new ones.

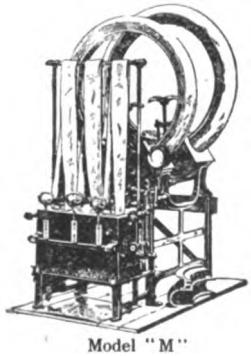
Tire and tube repairing goes on all the time and pays three to four times the average per cent. profit on motor cars.

But—do your repairing under the latest approved methods, with one of the outfits designed by the leading tire engineers—

Akron-Williams
TIRE REPAIR OUTFITS

Akron-Williams Vulcanizers are so designed that by the use of reducing shells, all the cavities can be used on smaller size tires, thus practically doubling the curing capacity of the outfit for most sizes.

There's an Akron-Williams outfit for every shop, and a machine or tool for every purpose.



Model "M"

Send for catalog and prices

The Williams Foundry and Machine Company

Glendale Street Akron, Ohio

Exclusive Distributors for California
The Waterhouse and Lester Co.
San Francisco, Oakland and Los Angeles

POWER

POWER ECONOMY ENDURANCE

Instead of the frequent expense and annoyance of removing Carbon, install

PRESSURE PROOF PISTON RINGS

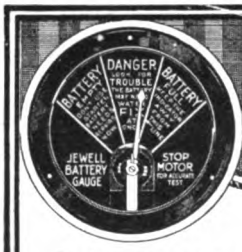
You will not only permanently eliminate carbon and cut down oil and fuel expense but your motor will have full power always, anytime, when you want it.

PRESSURE PROOF PISTON RING CO.



107 MASS. AVE. BOSTON, MASS.

PAT. MAR. 2, '16. FEB. 29, '16.



Jewell BATTERY GAUGE

Always a Convenience, A Necessity in Cold Weather.

Hydrometer tests are a nuisance at any time and seldom made often enough to afford any protection in the winter.

The **Jewell Battery Gauge** tells you the condition of your battery **all the time** in time to avoid it. Its cost is slight. Its value immense.

Owners and Dealers, Write for Details

MANUFACTURED BY
Jewell Electrical Instrument Co., 1646 W. Walnut Street, Chicago
Exclusive Sales Representatives: Gray-Heath Co., 1440 Michigan Avenue, Chicago

Have You Had Trouble With Your Tires?

The fault is not with the tires. You, or your chauffeur, or both, are to blame. The responsibility is yours because you should keep the tires pumped up to a specified pressure, and don't.

Tires that are kept up to the proper air pressure last twice as long—sometimes ten times longer—than tires that are run with not enough air in them. Measure your air daily with a

SCHRADER UNIVERSAL TIRE PRESSURE GAUGE

and get out of your tires all the miles they can give.

Price in U. S. A. **$1.50**

At your dealer or

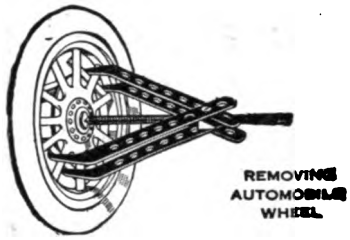
A. SCHRADER'S SON, Inc.
783-803 Atlantic Avenue, Brooklyn, N. Y.



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"LITTLE GIANT"
GEAR AND WHEEL PULLER



SAVES TIME—SAVES MONEY—SAVES TROUBLE

BECAUSE you don't have to hunt through your "kit bag" for a suitable tool—don't have to waste time. Any gear, wheel, pulley or bearing—big, little, inside or out—comes off in a hurry when the "LITTLE GIANT" takes hold of it. A powerful—all purpose puller. Wonderful one puller for all pulling work.

BECAUSE no waste effort—no long-drawn-out performance. "LITTLE GIANT" needs no wrench to hold in place. Never slips—never twists off. The harder the pull, the tighter the grip. Quickly adjustable up to 13 inches. Gives quick—powerful action.

BECAUSE the "LITTLE GIANT" is a life-time device. Constructed of tough drop forged steel. Nothing to wear out or get out of whack. The biggest pulling worth—biggest service worth ever packed into a single appliance.

In use in leading shops and garages. Price, $10. Money back if not satisfactory. Order from ad. or write for descriptive matter.

PREMIER ELECTRIC CO.,

4033 Ravenswood Ave. CHICAGO, ILL.



The ALLEN TIRE CASE

QUALITY means long wear, faithful service. STYLE adds distinction to the car. Allen Tire Case is a quality product plus distinctive style.

Allen Auto Specialty Co., 16 W. 61st St., New York
2007 Michigan Ave., Chicago

WHY USE SHELLAC?



When You Can Obtain Far Better Results With

Permatex Gasket Cement

Produces a pressure-tight union that is gasoline, kerosene, oil and water proof and has a heat resistance five times that of shellac.

If Your Jobber Cannot Supply You, Order Direct

LIST PRICES

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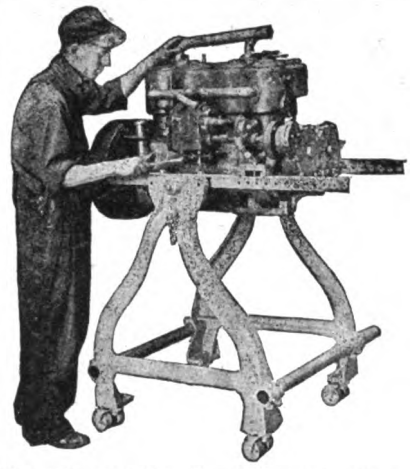
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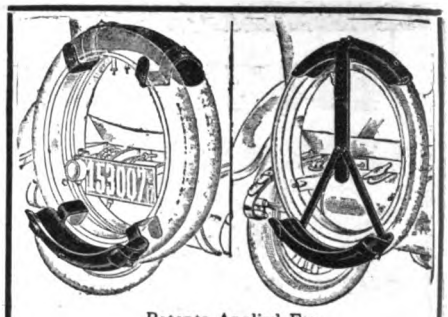
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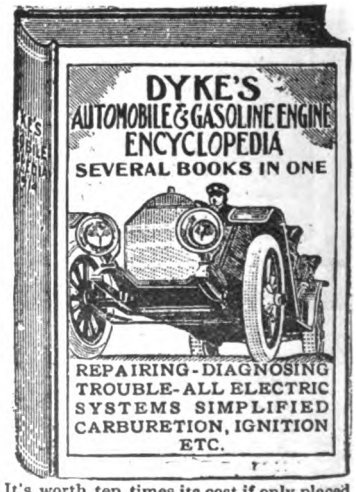
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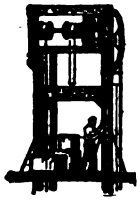
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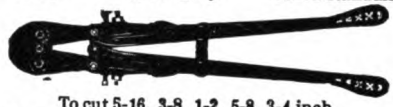
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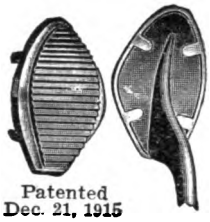


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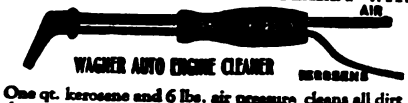
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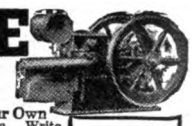
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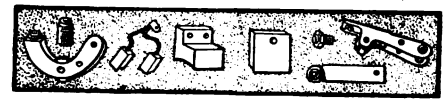
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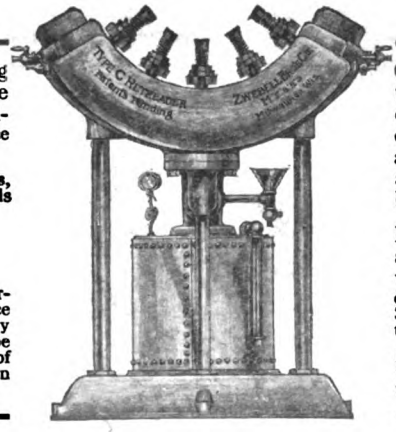
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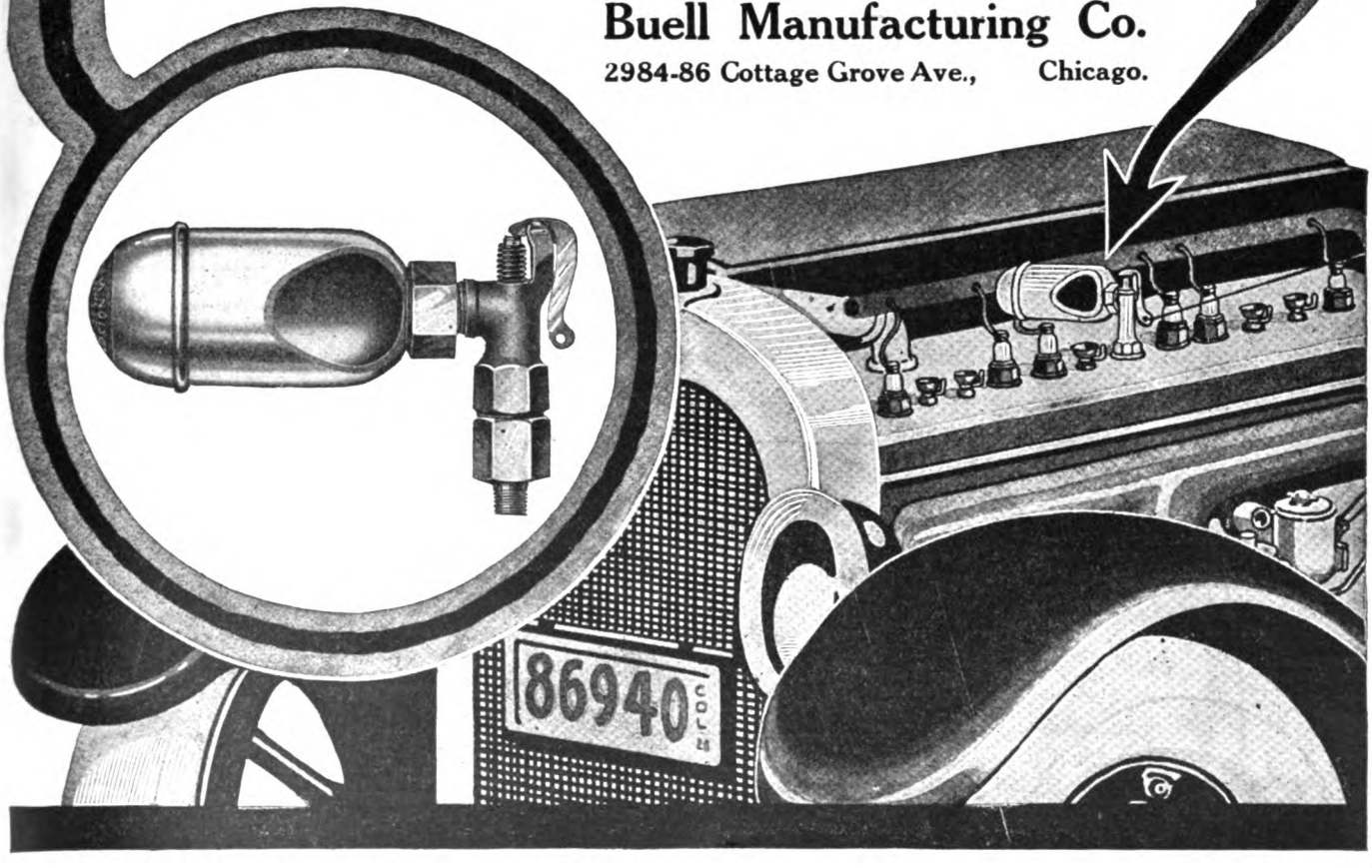
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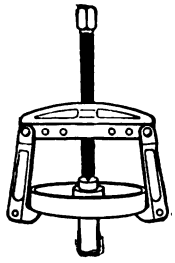


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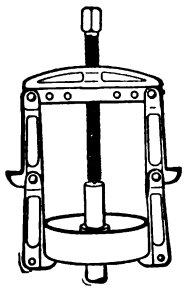
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With this New Locking Arm

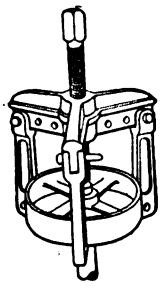
Absolutely Locks the Puller on the Work, making it a one-man tool



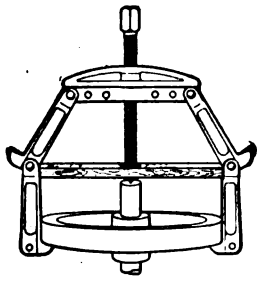
Two-Arm Puller removing work near end of shaft.



Work beyond reach of one set of arms.



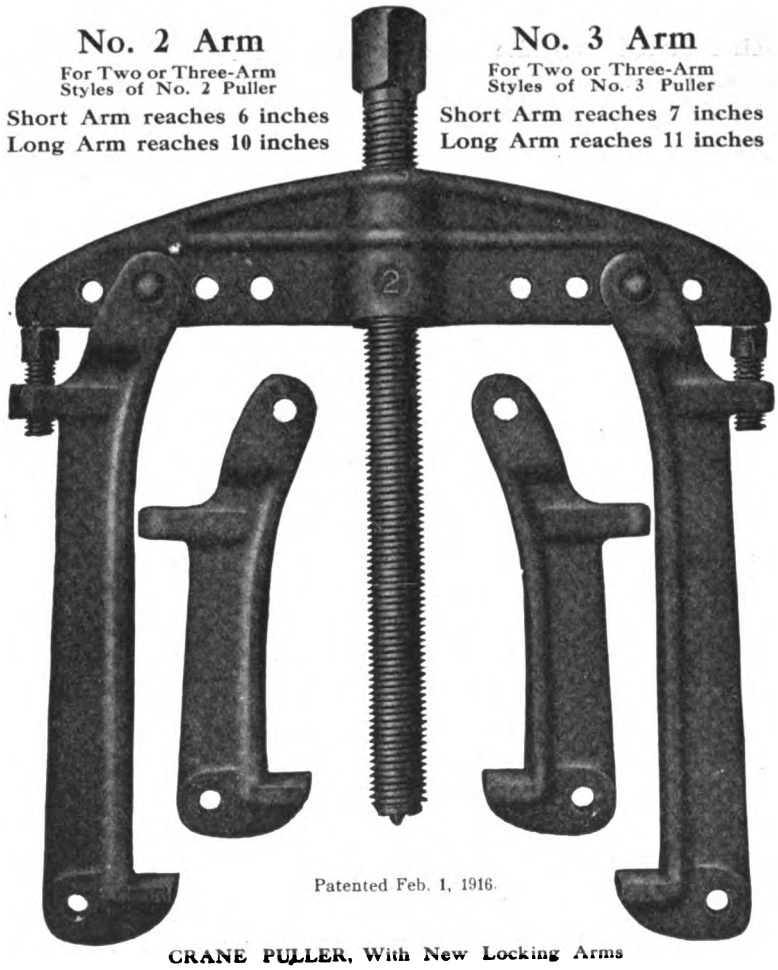
Three-Arm Puller pulling from three points will remove collars and work that cannot be started with the two-arm pullers.



Two-Arm Puller on work of large diameter (a piece of wood being used as a spreader.

No. 2 Arm
For Two or Three-Arm Styles of No. 2 Puller
Short Arm reaches 6 inches
Long Arm reaches 10 inches

No. 3 Arm
For Two or Three-Arm Styles of No. 3 Puller
Short Arm reaches 7 inches
Long Arm reaches 11 inches



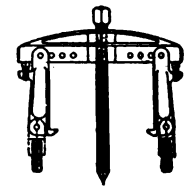
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CRANE PULLER, With New Locking Arms

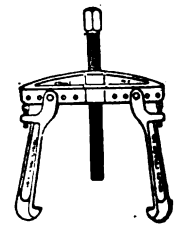
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Materials and workmanship absolutely guaranteed. We will replace any part that is defective, without question and absolutely free of charge, upon return of same to us.

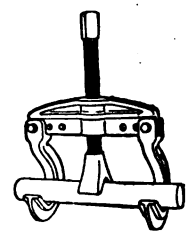
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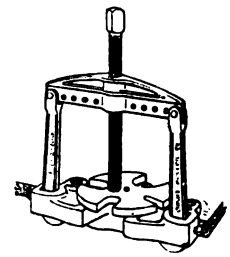
No. 0 Two-Arm Puller



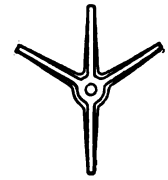
Patent Locking Arm



Pipe Bending and Shaft Straightening Attachment



Arbor Press Base



Crowfoot Beam

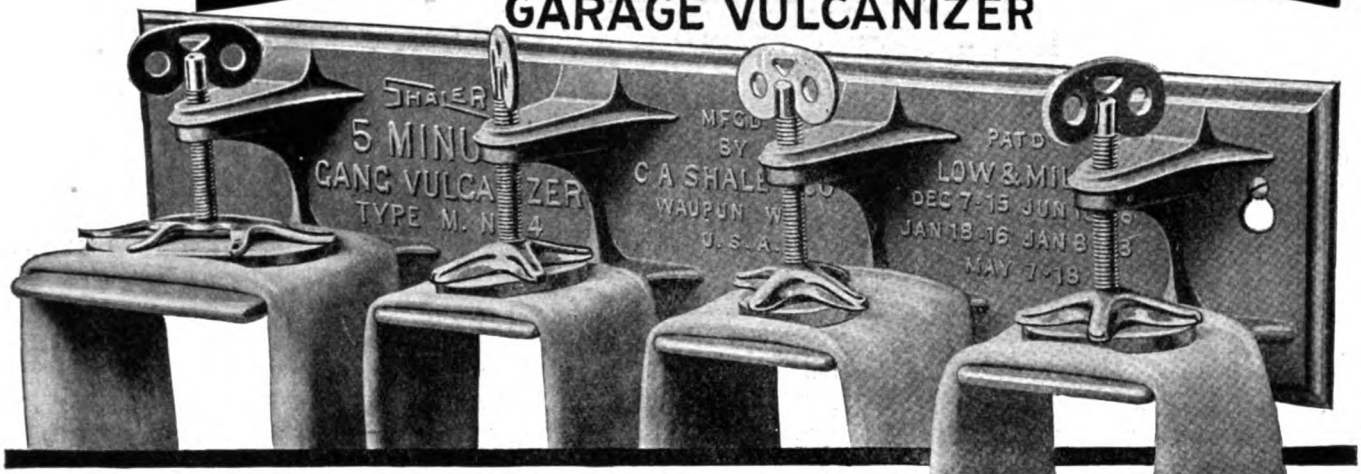
CRANE PULLER COMPANY

54 LAKE STREET - - ARLINGTON, MASS

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SHALER

5 MINUTE GARAGE VULCANIZER



Makes 4 Repairs in 5 Minutes

This new gang vulcanizer was designed especially to meet the demand from Garages and Repair Shops for a quick action, large capacity, dependable vulcanizer, that uses the convenient Shaler Patch-&-Heat Units. These handy units are very popular. Over 10,000,000 punctures were repaired with them last year. No other method is so quick, safe, convenient and satisfactory.

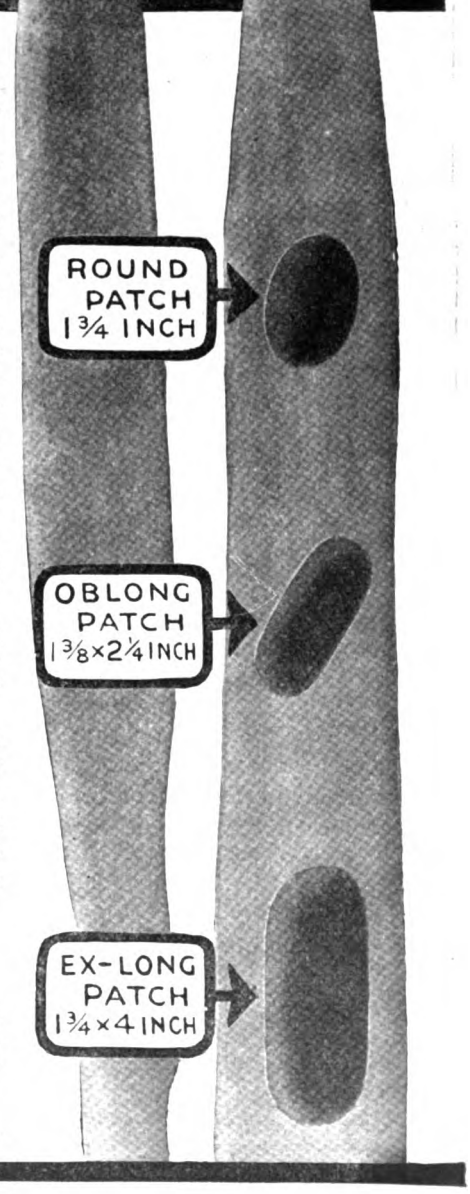
The Shaler Patch-&-Heat Unit—always ready for instant use—saves time and prevents delay. It is a complete unit—a compact combination of chemical fuel, vulcanizing pan and raw rubber patch. You simply remove the linen protection from the patch, clamp it over the puncture, light the fuel, and in 5 minutes you have a permanent, feather-edge repair, stronger than the tube itself—one than you can guarantee.

Free to Repair Shops

To quickly introduce this wonderful new Shaler Garage Vulcanizer—we will send *Absolutely Free*, with each outfit—an assorted supply of Shaler Patch-&-Heat Units, that will make repairs enough to more than pay for the outfit.

Our low List Price $10 is subject to 30% trade discount, making the Net Price to you only $7—and with the outfit we will send you Free Patches enough to more than pay for it, so that outfit costs you practically nothing.

You can obtain garage size, Large Packages of Shaler Patch-&-Heat Units from your jobber, at prices so low as to make this the cheapest method of vulcanizing. And there is no danger—no gasoline, no blaze, no flame, no trouble, no waiting to heat a vulcanizer.



Write Quick—or Ask Your Jobber

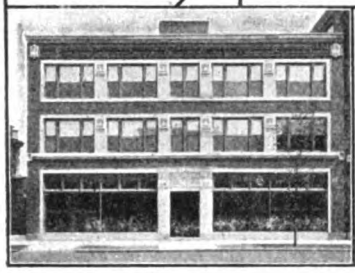
for full information about our Liberal Introductory Offer. This is a limited offer, for a short time only, to introduce this new Garage Vulcanizer. Take advantage of it now. You risk nothing, because we will send you Free Patches enough to more than pay for the outfit. Write now, and give us your Jobber's name, for full information.

C. A. Shaler Company, 812 Fourth Street, Waupun, Wis.

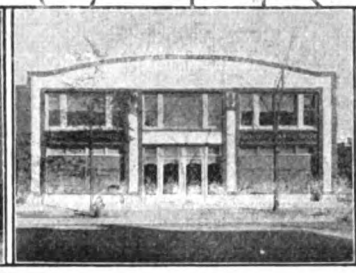
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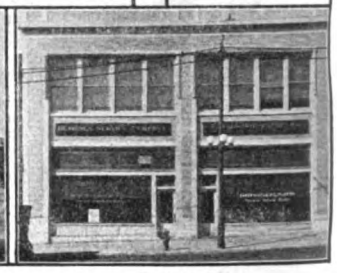
Delco KLAXON REMY

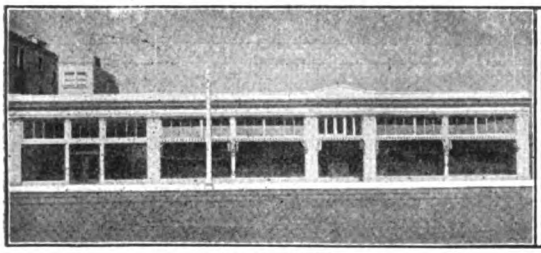
SERVICE


Chicago

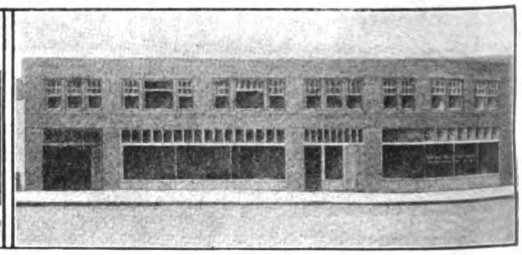

New York

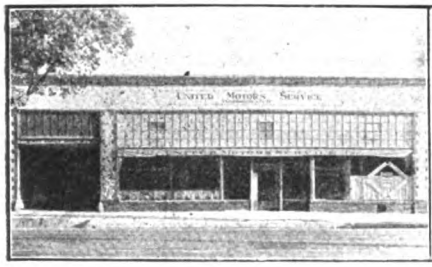

Denver

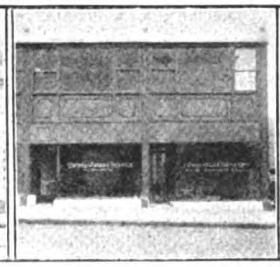

Kansas City

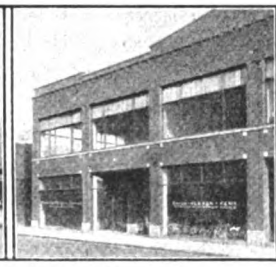

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Eleven Branches Established—Eleven More Branches Building

YOU want direct contact with the manufacturers of Delco, Klaxon or Remy when needing service on any of these equipments.

The Delco, Klaxon and Remy Companies have established in United Motors Service Inc. their combined service department. Pictured above are eleven United Motors Service Inc. branches where you may obtain this service. Another group of eleven branches is in process of being established.

Through these branches you eliminate most of the serious trouble that comes from neglect ordinarily. And, too, it is an economical service.

Genuine replacement parts — expert mechanics who are experienced in working on these products —these advantages you derive from dealing with the Official Factory Branches for Service.

United Motors Service Inc., and Authorized Distributors are the only national service organizations for Delco, Klaxon and Remy equipment.

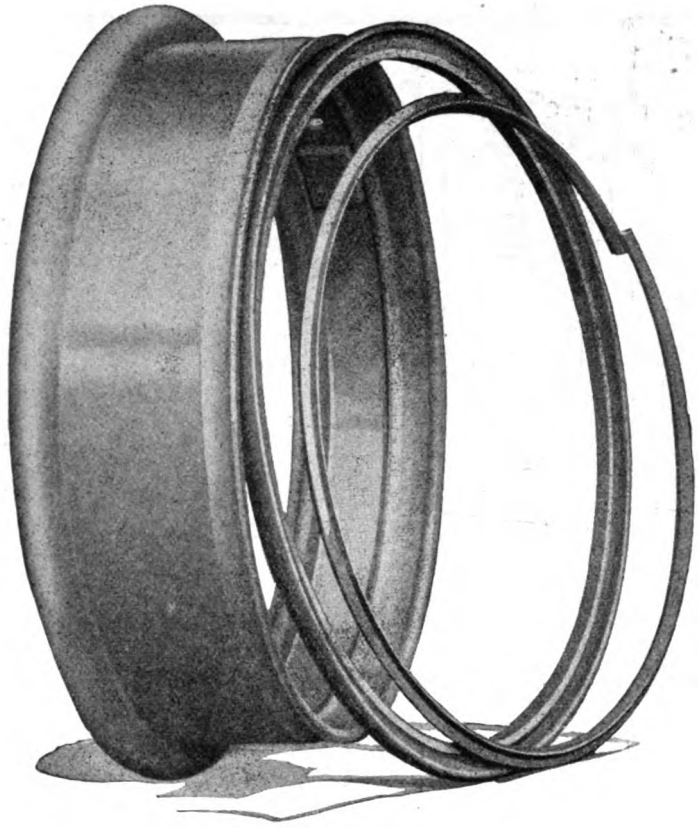
General Offices: Detroit, Michigan

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The Rim That Carries "Giants" Is Fit For Any Job

IF proof had been needed of the supremacy of Firestone Type C Rims for pneumatic tires it has been afforded by the success of these rims with Giant Pneumatic Truck Tires. Here, as on high-grade passenger cars, the established features of Type C Rims have shown their strength, their economy, and their practical, every-day convenience.

You remember these superiorities:

1. Continuous, one-piece base.
2. Continuous surface contact with felloe.
3. Continuous removable side ring with split locking ring.
4. Rim mounted on wheel with continuous wedge ring, the foundation principle of Firestone Rim success.

One man can make a tire change of the largest truck pneumatic tires when mounted on Firestone Type C Rims.

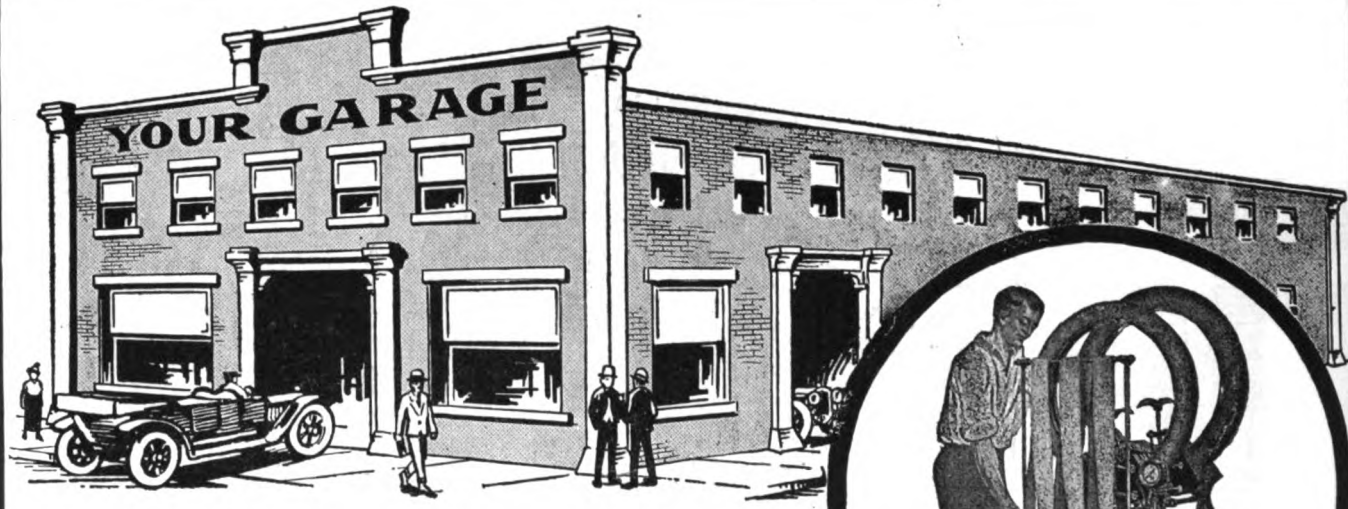
Firestone Type E Rims are just as successful in their field, for light cars.

If you want most mileage, least "grief" and greatest ease and convenience of tire change, see that your pneumatic tires have their foundation in Firestone Rims.

The Firestone Steel Products Co.

FIRESTONE PARK, AKRON, OHIO

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DEALERS—Add Tire Repairing to your present business, *because:*

First—Tire repairing, like motoring, goes on all the time and brings in a steady return of profits—*three times* the percentage your average on selling motor cars.

Second—It helps you to hold *all* the business of your present customers, and to win more and more new ones.

Third—You can start on a very small outlay, and add new equipment as your business grows; the work is quickly done, and once started, it grows fast.

Akron-Williams

TIRE REPAIR OUTFITS

Used, Sold and Recommended by All Leading Tire Companies

Each and every piece of this equipment has been designed and perfected by our engineers working in conjunction with tire engineers from the leading rubber factories—that is one reason why Akron-Williams equipment excels in efficiency.

Our vulcanizers are so designed that their capacity on small sizes can be doubled by using reducing shells.

Most complete line of Outfits, Machines and Tools—send for new catalog just out.

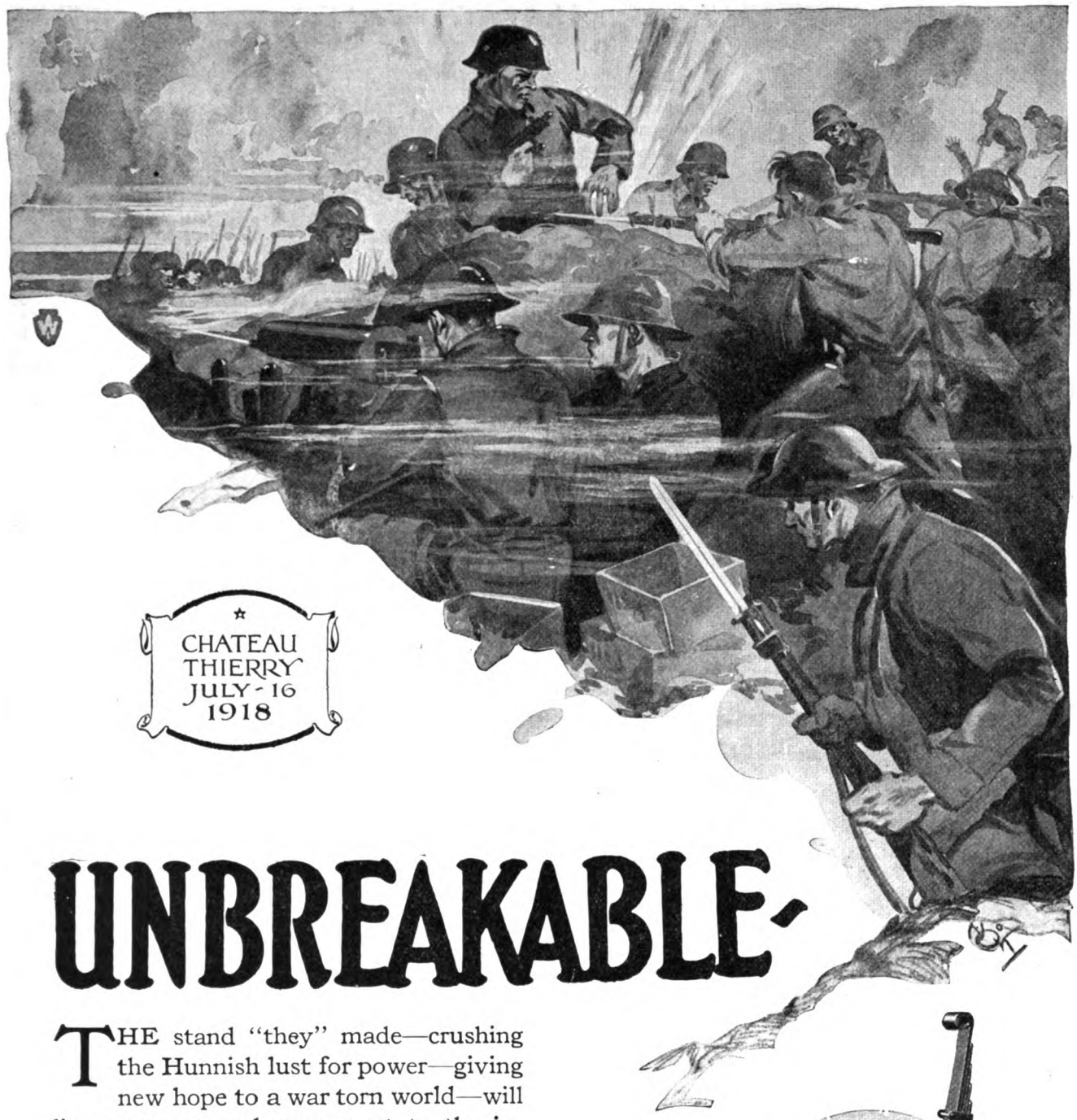
THE WILLIAMS FOUNDRY & MACHINE CO.

AKRON-WILLIAMS A-W PRODUCTS

Glendale Street, Akron, Ohio

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THE stand "they" made—crushing the Hunnish lust for power—giving new hope to a war torn world—will live as an eternal monument to the indomitable spirit of American manhood. Their's the honor: sublime, imperishable.

Ours the satisfaction of knowing that somewhere behind the lines Government trucks equipped with Harvey Springs served them with supplies.

Send for latest Spring Book showing 1000 Automobile Springs.

HARVEY SPRING & FORGING CO.
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NEW MATERIAL for IMMEDIATE DELIVERY

55	Sets Westinghouse 6-volt Starting-Lighting Systems, consisting of No. 700 frame Starter, with Bendix Drive and Starting Switch and No. 400 frame Generator and Regulator Cutout. Per set, complete as above	$42.50
55	No. 700 frame Westinghouse 6-volt Starter, with Bendix Drive and Starting Switch	22.00
251	No. 400 frame Westinghouse 6-volt Generator and Regulator Cutout	25.00
45	Sets Remy 6-volt Starting, Lighting and Ignition Systems, consisting of Model 166-C Generator with Model 60 Relay Regulator, Model 172-A Coil, Model 209 6-cyl. Distributor and Model 180-B Starter with Bendix Drive. Per set	65.00
45	Remy Model 166-C Lighting Generators, 6-volt, with Model 60 Relay Regulator, Model 172-A Coil, Model 209 6-cyl. Distributor. Complete	39.50
45	Remy Model 180-B Starters, 6-volt, with Bendix Drive. Each	32.50
90	Auto-Lite Model GD Generators, 6-volt. Each	20.00
360	Splitdorf Model RGU-1 Generators, 6-volt, with Regulator Cutouts. Similar to Westinghouse No. 400 frame Generator. Each	21.50
60	Gray & Davis type MG-9 Combination Starting and Lighting Systems, 6-volt, less Regulator Cutout. Each	18.00
250	Whitney Silent Chains, ⅜ in. pitch, 1¼ in. wide, length 27 in. Per foot	1.00
24	Gray & Davis 6-volt Regulator Cutouts. Each	$4.25
400	Connecticut Coils, Model GA. Each	7.50
98	Connecticut Coils, Model GOM. Each	7.50
402	Connecticut 6-cyl. Igniters, Model 16. Each	8.00
30	Bosch DU-4 Magnetos, independent clockwise rotation. Each	37.50
65	Remy Magnetos, Model P-4 cylinder. Each	12.00
35	Remy Magnetos, Model P-6 cylinder. Each	14.00
22	Simms 4-Cylinder Magnetos, Model SU-4. Each	19.00
680	Jumbo Spark Plugs, ⅞-18 long (Buick). Each	.20

NEW CASINGS AND TUBES

(Firsts, with Manufacturers' Serial Number)

Send for List of Tires and Tubes

94	32x4 Standard make Clincher Tires, plain tread, consisting of Casing and Tube. Per casing and tube	22.50
112	32x4 Standard make Clincher Tires, non-skid, consisting of Casing and Tube. Per casing and tube	25.25
40	34x4 Standard make Clincher Tires, plain tread, consisting of Casing and Tube. Per casing and tube	24.00
62	34x4 Standard make Clincher Tires, non-skid, consisting of Casing and Tube. Per casing and tube	25.75
160	32x4 Standard make and other make Tubes. Each	$2.75
90	34x4 Standard make Tubes. Each	2.85
82	33x4½ Standard make Tubes. Each	3.50
39	35x4½ Standard make Tubes. Each	3.75
15,000	ft. Brake Lining, size 3/16 in. thick by 3 in. wide. J. M. Non-Burn. Per foot	.38
1200	lengths Radiator Hose, 3-ply, 36 in. lengths, 2 in. inside diameter. Per 36 in. length	1.00
	Also many other sizes of Radiator Hose.	
26	Stromberg Carburetors, Model H-4. Each	16.00
38	Stromberg Carburetors, Model L-2. Each	12.50
41	Stromberg Carburetors, Model L-4. Each	19.00
18	Rayfield Carburetors, Model G-4. Each	18.00
1,600	sets Auxiliary Seat Irons, new type that fold up against back of front seat, complete with lazy back irons. Per set of irons for two seats	4.00

ACCESSORIES FOR FORDS

2,000	Radiator Hose, 3-ply, 1¾ in. inside diameter by 2¾ in. long. Each	7½c
4,000	Radiator Hose, 3-ply, 2 in. inside diameter by 3½ in. long. Each	11½c
2,000	Rear Brake Drums. Each	20c

BETTER QUOTATIONS IN QUANTITIES

We sell for cash only to the trade. No retail business accepted. Complete list of material on request.

S. BREAKSTONE, 1322-24-26 Michigan Avenue, CHICAGO, ILLINOIS

S-M-C

Trade Mark Registered U. S. Pat. Office

NOW is the time to reline brakes. If

S-M-C Asbestos Brake Lining

is used, everyone gets thorough satisfaction—

The car owner—because **S-M-C** means **Safety Made Certain**—always—all ways. Does not burn, glaze or crumble—as quiet as it is enduring.

The garageman or **repairman**—because he has secured a good profit, on an article that protects his reputation and adds to his satisfied customers.

Write today for our liberal quantity discounts on **S-M-C**; sold in rolls, made in all widths up to 6 inches.

Staybestos Mfg. Co., 5541 Lena St., Philadelphia, Pa.
I want your quantity prices on S-M-C Brake Lining and Universal Transmission Lining—particularly on your $1.25 FORD Set.
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TRANSMISSION LINING

The Live Dealer's Best Bet

Not alone because it gives longer service than any other cotton lining—

Not alone because it is absolutely chatterless—

Not alone because it is compactly woven like **S-M-C**, then treated with a perfected compound which makes it slip-proof, water-proof and oil-proof—

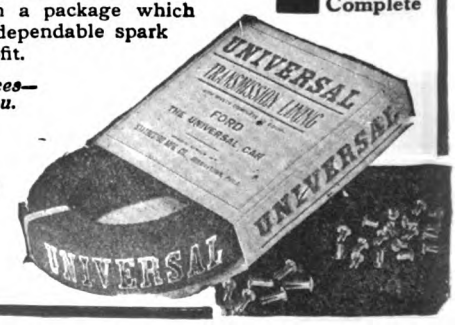
But also because our

Handy Set For Fords

$1.25 Complete

includes the three proper lengths for Ford transmission bands and all rivets required. Boxed in a package which sells as easily as a dependable spark plug—at a good profit.

Get Our Quantity Prices—They Will Interest You.



STAYBESTOS MFG. CO.

5541 Lena Street, Philadelphia

The "Modern Factory" equipped to make all types of brake lining and all widths up to 6 inches

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Every year thousands of accidents occur to cars either towing or being towed.

THE MAIN CAUSE of these accidents has been the old-fashioned, flexible tow-line. When a short rope was used, sudden stops often meant that the towed car smashed into the towing car. This was especially true if the brakes of the rear car were out of order or failed to work instantly. Where a long rope was used to reduce the possibility of jamming, pedestrians have been tripped and run down, and another car coming suddenly out of a side street has on hundreds of occasions collided with tow-line. Anyone who has ever had to do with a disabled car will appreciate these conditions and realize the value of this new Weaver Appliance.

The Weaver Towing Pole is made of heavy, double strength steel tubing, and is adjustable in length from 5 ft. 6 in. to 8 ft. While the pole is sufficiently rigid to enable it to control the rear car, a coil spring, applied in such a manner as to provide tension both ways, absorbs all shocks from sudden starting or stopping.

To attach the Weaver Towing Pole is but the work of a minute. A 36-in. chain is employed to lash around the "V" shaped socket, and a heavy woven pad prevents either chain or socket from marring finish of car. Chain is held by a secure spring plunger.

Don't tempt fate any longer by using ordinary tow-lines. The damage caused by one small accident will cost more to repair than several Weaver Towing Poles, and the poles will last a lifetime.

Write NOW For Catalog describing this article and also the entire Weaver Line of SHOP EQUIPMENT. Modernize your garage by Weaverizing it and you will be able to lend many mechanics to Uncle Sam and still handle your usual run of business.

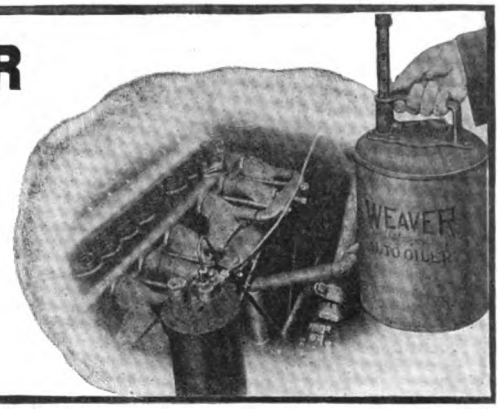
WEAVER MANUFACTURING CO., -- 2175 South 9th Street, -- SPRINGFIELD, ILLS.

THE WEAVER AUTO OILER

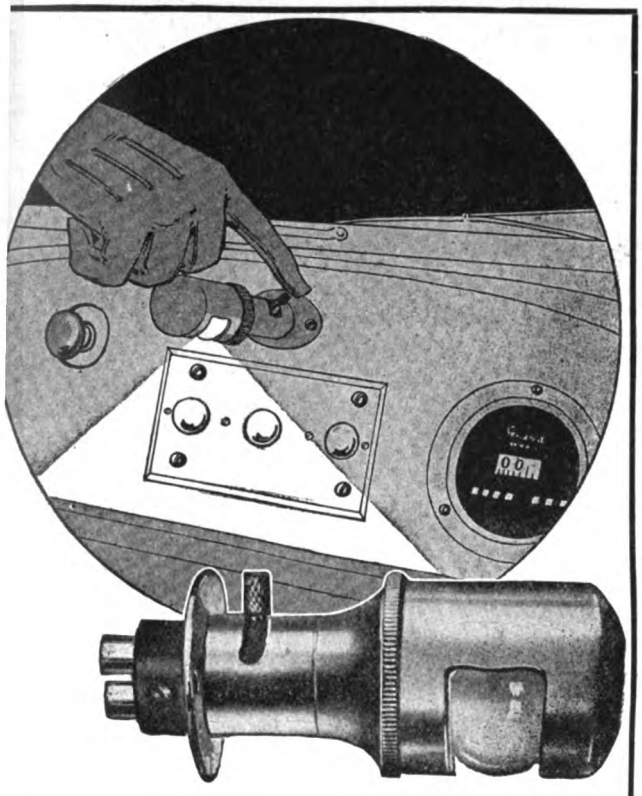


Does entirely away with the dripping measuring can and the dirty funnel. You fill the Weaver Oiler and place it alongside your gasoline tank. When a man wants oil, you merely twist the spout to conform to the position of the oil opening, press a button and watch the indicator till the desired amount is registered. Then you release pressure on the button and turn the spout back to its normal position.

Saves time, saves oil, guarantees accuracy, eliminates dirt, Both you and your customers will appreciate the Weaver Auto Oiler. Order one for every grade of oil you handle. Read its full description in our complete catalog.



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Connecticut "P S" Dash Lamp

This is the most modern type of Dash Lamp on the market—a complete piece of equipment, better in every way than the ordinary Dash Lamp in that its control switch is incorporated in it, thus obviating the necessity of an extra controlling switch and a more or less involved scheme of wiring.

It is substantially made, heavily nickeled and beautifully finished.

People are quick to appreciate the superior practicability of such a lamp and it finds a lively sale with all classes of motorists.

Price, without bulb, 75c

CONNECTICUT TELEPHONE & ELECTRIC COMPANY
MERIDEN, CONN.

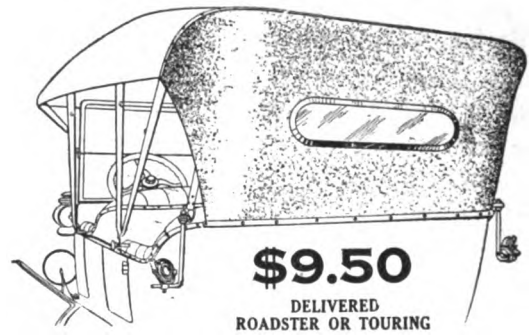
CONNECTICUT

WHITING-ADAMS
BRUSHES
ALWAYS SUIT — NEVER FAIL
ALL KINDS
FOR SALE EVERYWHERE



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Artists' Brushes
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Railroad Brushes
VULCAN
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JOHN L. WHITING-J. J. ADAMS CO.
BOSTON, U. S. A.
Brush Manufacturers for Over 108 Years and the Largest in the World



$9.50
DELIVERED
ROADSTER OR TOURING

BEVEL GLASS FORD CURTAIN
Ready for Anyone to Attach

Eliminates discolored and broken out old-fashioned celluloid. The 6x26 clear vision bevel glass enables you to see the entire width of the road behind and avoid accidents. It adds class and style to the appearance of your car.

ECONOMICAL, having three thicknesses of standard Ford material. Makes it practically indestructible and the weight of the glass is carried in an ingenious manner. We guarantee and insure frame against pulling loose from the goods.

The complete outfit to entirely replace old back curtain, standard Ford material, is $9.50 prepaid to any P. O. in the U. S.

Send cash with order or $1.00 deposit and we will ship, balance C. O. D., Parcel Post.

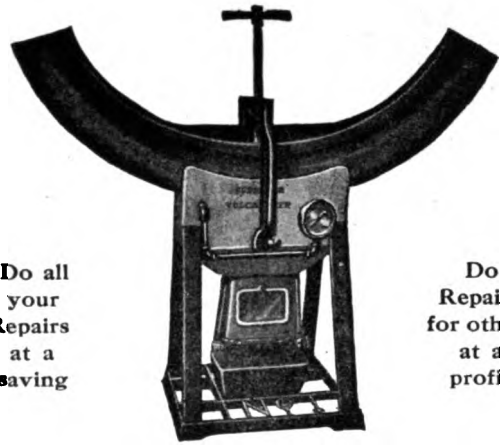
We supply this light in any size Curtain for any make car, in any grade of goods. Prices upon application.

SUBSTANTIAL DISCOUNT TO BONA FIDE DEALERS AND LARGE USERS.

C. MARVILLE DWYER
Manufacturer and Jobber
AUTO TOP AND BODY SUPPLIES
116 West Washington St., Los Angeles, Cal.

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A Real Vulcanizer
A Real Money Saver
Superior Vulcanizers



Do all your Repairs at a saving

Do Repairs for others at a profit

Write Now for Descriptive Catalog

Superior Vulcanizer Co.

16A Fulton Avenue, Rochester, N. Y., U. S. A.



ATTENTION

We wish to ANNOUNCE

that we now do all kinds of expert armature rewinding

QUICK SERVICE

remove, *v.* To move or cause to be moved out of a place; transfer from one place to another; as, to *remove* a tree.

consume, *v.* To destroy gradually, as by burning, eating, etc., or by using up or wearing out.

—*Standard Dictionary*

Are you getting your "money's worth," or are you "removing" the carbon deposits—"as, to remove a tree"?

When carbon deposits are "removed" from automobile cylinders, just that much gasoline has been **poured on the ground.**

When carbon deposits are "consumed" from automobile cylinders, **every bit of power** contained in the gasoline has been **utilized.**

CARBON-X

The Guaranteed Carbon Consumer

Causes the carbon deposits to be **consumed as fuel,** and the **power** thus derived is **delivered at the crank-shaft.** Carbon-X is **not** a carbon "remover"—it is a carbon **consumer.**

Since the carbon deposits represent that portion of the gasoline which has not delivered its quota of power to the crank-shaft, it readily will be seen that Carbon-X is an important factor in the proper conservation of gasoline.

Carbon-X is easy to use

The services of an expert mechanic **are not required**—nor is it necessary to "lay up" the car—when using Carbon-X. Being made in tablet form, it is only necessary to remove the spark plugs after warming up the motor, insert the desired number of Carbon-X tablets according to the very simple directions on the carton, replace the spark plugs, and **drive the car.**

Carbon-X positively **will not injure** the interior of any motor, nor affect the lubricating oil in any manner. There is nothing about Carbon-X that can cause trouble—anyone who can handle a spark plug wrench can apply Carbon-X and obtain **real results.**

All argument as to whether Carbon-X "will do the work" has been **eliminated.** This unqualified and unprecedented guarantee is printed on every carton: **"Every package contains satisfaction—money refunded if you don't find it"**—and it means just what it says. The user's decision is final.

MR. CAR-OWNER: Many dealers have not yet stocked Carbon-X. If your dealer cannot supply you, send us his name and a dollar bill and we will mail you the regular $1 carton containing 30 tablets postpaid.

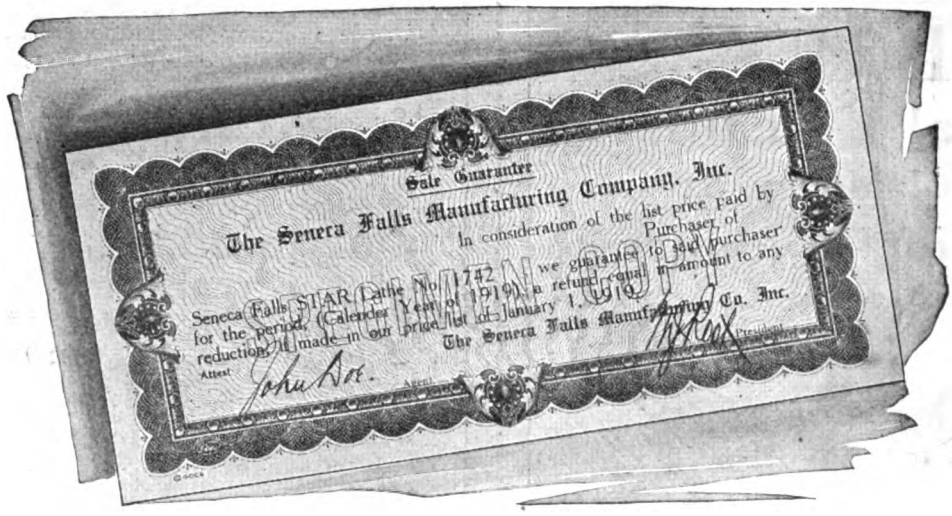
MR. DEALER: To save time, order a dozen cartons of Carbon-X direct, giving us instructions to bill through your jobber. Initial order will be shipped prepaid.

MR. GARAGE MAN: If your territory is not already covered by Carbon-X Service, ask about this big-money-making, bring-'em-back-for-more Carbon-X Service Station plan. It's different.

Ask for our unusual booklet—"WHY IS CARBON?"—it's free.

"C-P" CHEMICAL CO., 305-326 River St., Chicago, Ill.

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This Certificate Protects Every "Star" Lathe Purchaser Against Price Decline.

WHEN you purchase "Star" Lathes you receive a Certificate guaranteeing you a refund equal to any possible reduction in price in 1919. Should prices go down for any reason you are protected. Made in 9 inch, 11 inch, 12 inch and 13 inch swing sizes.

The Seneca Falls Manufacturing Co., 383 Falls St., Seneca Falls, N. Y.

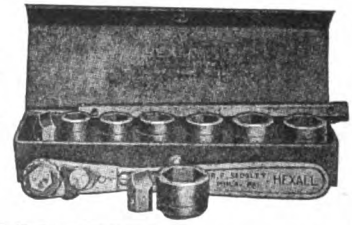
Break Any Sedgley Wrench and We Repair It Without Charge

Sedgley Quality is Your Guarantee of Durability

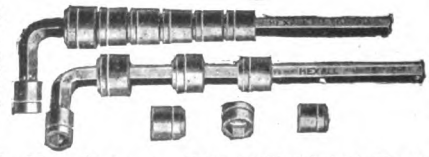
Get Your Order in Today

HEXALL WRENCHES SELL RAPIDLY and once in a while a dealer gets caught short—but that's no way to do business—to tell a customer that "you carry them but you are just out of them"—or in other words, you're making money but you don't get it in your hand—making profits in your mind isn't tangible enough to keep your business on its feet very long. Get that delayed order in to us to-day—keep your stock up!

"HEXALL" No. 2 contains—7-in. Steel Forged Handle, 2 Screw-Driver Bits, 7-in. Extension Bar, 7 Hexagon Sockets. Packed in neat, strong cloth case.



"HEXALL" No. 5. 10 inch Handle made from ½ inch Hexagon Steel, 7 Hexagon Sockets, with same range as No. 2 set. Sockets pack neatly on handle when not in use. Friction Ball prevents them from falling off. Can be used as an extension with wrench on short end.



Ask Your Jobber

R. F. SEDGLEY, Manufacturer, 2311-13 North 16th Street PHILADELPHIA, PA., U. S. A.

Also Manufacturer of the "Baby" Hammerless Revolver.

Pacific Coast Representatives: McDonald & Linforth, 739 Call Bldg., San Francisco, California.

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"WHITNEY" KEYS

FOR THE
WOODRUFF SYSTEM

For the benefit of dealers, garages, and repair men, we are prepared to furnish our keys put up in two assortments. Every garage and repair man should keep these on hand. They may be purchased from the leading jobbers or ordered direct from the factory.

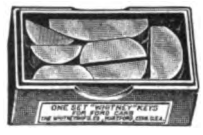


Regular Assortment

One hundred keys of the sizes most likely to be required for repair work.

Ford Assortment

One set of keys for the Ford car. These keys are of the special material and special treatment specified by the Ford Motor Company.



THE WHITNEY MFG. CO.

HARTFORD, CONN.

Chains Keys Hand Milling Machines

"NORMA"

"NORMA" PRECISION BALL BEARINGS

(PATENTED)

The lowest cost per mile or per hour service—the period of reconstruction makes this an ideal toward which builders and users of cars, trucks, tractors, power boats and airplanes must strive. And in the effort toward its attainment, no small part is played by the electrical equipment of these automotive units.

Dependable ignition and dependable lighting are prime essentials to dependable, low-cost service. Which explains why builders of high-grade ignition apparatus and lighting generators, in standardizing on "NORMA" Ball Bearings, have so generally availed themselves of the proved "NORMA" dependability in speed service.

Be Sure—See that Your Electrical Apparatus is "NORMA" Equipped

THE NORMA COMPANY OF AMERICA

1790 BROADWAY NEW YORK

Ball, Roller, Thrust and Combination Bearings.

"NORMA"

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REG. U.S. PAT. OFF.
G T D



Little Giant Die, Guide and Collet



Little Giant Die

A Pointer

Poor tools or lack of tools is the greatest hindrance the repairman has. The novice with an assortment of good tools can accomplish more.

No garage equipment is complete without a G T D Screw Plate. Not only will it recut jammed threads, but new threaded parts can be made—and it's mighty hard to get spare parts now-a-days.

G T D Screw Plates are made in over a hundred assortments. Yours is among them.

Write for New Small Tools Catalog No. 40, describing Screw Plates, Taps, Dies, Reamers, etc.

Greenfield Tap and Die Corporation
Greenfield, Massachusetts

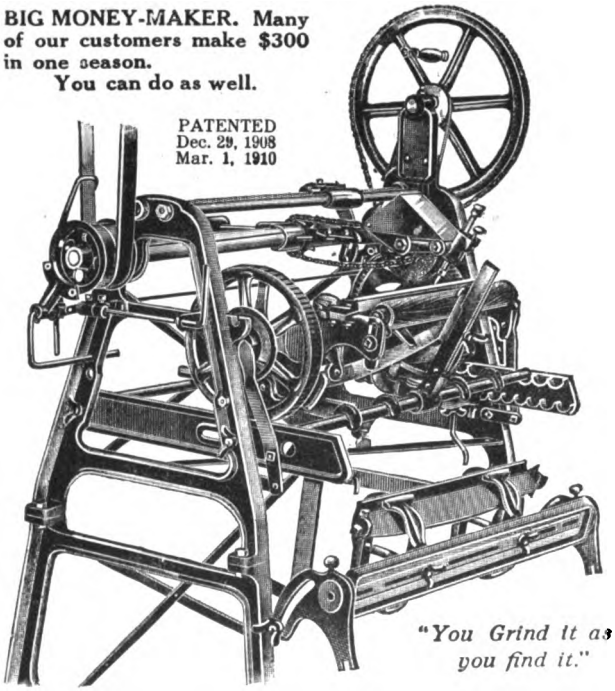
New York, 28 Warren St. Chicago, 13 So. Clinton St. Detroit Office, 74 Congress St., W.
Canadian Plant ..... Wells Brothers Company of Canada, Ltd., Galt, Ontario

Buy a
G T D Screw Plate
With
Little Giant Adjustable Reversible Dies

"IDEAL"
Lawn Mower Grinder

BIG MONEY-MAKER. Many of our customers make $300 in one season.
You can do as well.

PATENTED
Dec. 29, 1908
Mar. 1, 1910



"You Grind it as you find it."

Grinds all kinds of Mowers perfectly in 15 minutes without removing wheels, ratchets or reel-knife, BETTER, QUICKER and EASIER than it can be done by hand. Has perfect Skate Sharpener Attachment. Run by hand or power. Nearly 10,000 in use. Sold on easy payment terms. Also makers of the "Peerless" Horsemower Grinder.

WRITE TODAY for catalog and full information.

The Root-Heath Mfg. Co., 101-119 Bell St., Plymouth, O.

S.O.S

TRADE-MARK REGISTERED

We guarantee that S.O.S. Battery Plates positively will not buckle or sulphate during the entire life of any S.O.S. Battery.

STORAGE BATTERIES
ARE WONDERS ON ALL CARS

BEST TO USE *BEST TO SELL*

Our Pocket Battery Guide lists the right battery for all cars, and for Farm Light Plants.

Our **Replacement Plates** fit other makes of batteries. Repairmen prefer S.O.S. plates because they are fully formed. Send for Replacement List and Guide.

VICTOR STORAGE BATTERY CO.
701 4TH AVENUE MOLINE, ILL.

PRESSURE PROOF
piston rings



POWER · ECONOMY · ENDURANCE

Pat. Mar. 2, 1915, Feb. 29, 1916

For Actual Efficiency and Constant Dependability

under the most severe service, Pressure Proof Rings have proved their claim to superiority. These rings permanently eliminate carbon, increase the motor's power, prevent loss of compression, and cut down oil and fuel expense.

Pressure Proof Piston Ring Co.
107 Mass. Ave., Boston, Mass.

THE RING WITH THE SPRING

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I JUST STEPPED IN

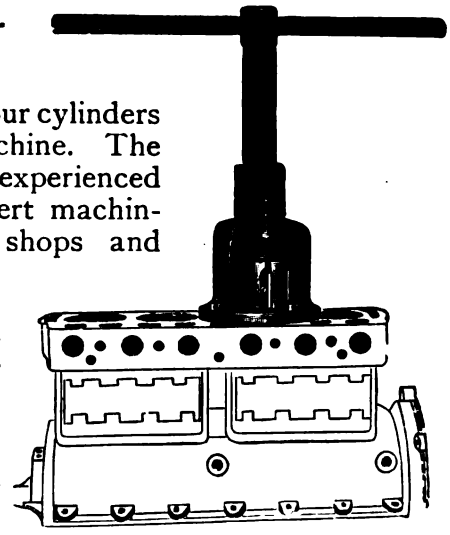


to ask you to be sure and send for price and the full particulars.

The Davis

Cylinder Reboring Jig and Reamer

Increases the Earning Power of Your Shop

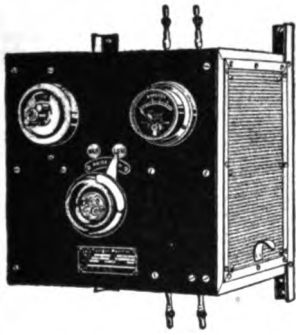


ONE MAN can rebore a set of four cylinders in sixty minutes with this machine. The tool centers itself, and an inexperienced man can do as good a job as an expert machinist. With this tool, the smaller shops and garages can rebore cylinders and guarantee the work to be as good as the larger dealers with their expensive machinery. Makes the motor better than new.

Write for Price and Full Particulars

The HINCKLEY MACHINE WORKS
HINCKLEY, ILL.

FOR BATTERY CHARGING



Tungar

The 6 amp. 75 volt Tungar Rectifier is a practical device demonstrated by actual service. It equips your garage for efficient battery charging at a much lower cost than any other reliable device of similar capacity.

Ask for Folder 63951

GENERAL ELECTRIC COMPANY

General Office: SCHENECTADY, N. Y. 25 A-3



The Handiest of All Tools

For adjustments and repairs, a pair of dependable pliers is the one indispensable tool. But remember, there are pliers —and pliers.

Red Devil Pliers

REG. U.S. PAT. OFF.

are the favorites of expert mechanics, because of their strength, scientific shape and heft. There are many styles of "Red Devils." No. 1024, 6½ inch (illustrated), is a slip joint tool that can't be beat for all 'round usefulness. Its thin nose gets into close corners *and holds*. It has a wire-cutter and screw-driver end; nickel plated finish.

SMITH & HEMENWAY CO., Inc.
83 Coit Street - - Irvington, N. J.

"Red Devil" is the Expert Mechanic's Guide to known quality in Pliers, Electrician's Tools, Hack Saw Frames and Blades, Auger Bits, Chain Drills and other Hand Tools, all of a class with "Red Devil" Glass Cutters, the biggest sellers in the world.



TIRES AND GAS AREN'T ALL

Mr. Accessory Dealer—You make every effort to sell your customers tires that stand the gaff for many miles. You keep your tank full of "gas" that gives the most mileage per gallon. But how about lubricants?

The matter of proper lubrication is just as important to you as to your customers. Customers are growing more watchful of what they buy and what they spend. It pays in the end to sell and recommend

Write for Dixon's Dealer's Deal No. 184-G

DIXON'S GRAPHITE Automobile LUBRICANTS

Dixon's put a veneer over bearing surfaces that lasts long and makes a car run farther and better. That's what your customers want. Be ready to meet their demand.

Made in Jersey City, N. J., by the
JOSEPH DIXON CRUCIBLE CO.
Established 1827

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ENDURA

THE TRUE SERVICE PACKING



No motor engine is fit for service unless the several parts which are bolted together are properly packed.

The packing that will absolutely insure a tight joint and keep the motor free from gasoline and oil leakage is ENDURA.



This advertisement is placed before you to enable you to understand that ENDURA PACKING is made for service. Why not give your customers the benefit of this wonderful service by using ENDURA PACKING on all repair work in the future?

Write us for the address of our nearest agent.

THE ENDURA MANUFACTURING CO.

63rd St. and Eastwick Ave., Philadelphia, Pa.
45 Lafayette Street, - - New York City

Agents in all principal Cities from Coast to Coast

A Tire That is Puncture Proof



The Result of Ten Years' Testing

After these ten years of experimental labor and crucial tests our efforts have been rewarded. The results are that the **Brictson Tire** is proving itself a revelation to the motoring world.

It Solves the Tire Problem

Because it is—puncture proof, blowout proof, skid proof, rut proof, rim-cut proof, oil proof, gasoline proof, trouble proof.

10,000 Miles Guaranteed

Can you beat that? Many motorists will say, "I don't believe the tire is made that will run me 10,000 miles." Our emphatic reply is, "There is *one* that will do it—and that's the **Brictson.**" With every tire sold, we give a **Specific, Written, Service Guarantee for 10,000 Miles.** Of course, we could not make this exceptional offer had we not put **Brictson** Tires through the various crucial tests that have proven their superiority beyond all question. For the man who doubts, we will do more than that. We will allow you to

Try It First—Before You Pay

The combination of our 10,000 mile guarantee, our puncture proof guarantee and our unprecedented "try it first before you pay" offer, makes our proposition overshadow any project ever before attempted in the tire industry. We offer to let you try **Brictson** Tires on your car **At Our Expense.** Could a manufacturer offer a greater proof of confidence?

Retread Your Present Tires

If you have some new tires at the present time, apply **Brictson Treads** and make them puncture proof, blowout proof, skid proof, rut proof, rim-cut proof, oil proof, gasoline proof—**Trouble** proof. This will convince you of **Brictson** quality and will mean that for the future you will use nothing other than **Brictson** Tires.

Or, you no doubt have in your garage a few old casings where the rubber tread is worn thin. Here is your opportunity to apply **Brictson Treads,** making them proof against all road troubles and get a good long mileage from them.

Don't bother about writing a letter. Just clip the coupon at left, fill it in and mail to us **Today.** It puts you under no obligation.

BRICTSON MFG. COMPANY
Dept. 129, 1015 to 24 W. O. W. Bldg
Omaha, Nebraska

FREE TRIAL COUPON

Brictson Mfg. Co., Dept. 129, 1015 to 24 Woodman of the World Bldg., Omaha, Neb.
Please send to me by return mail, the details of your Free Trial Offer and complete information about Brictson Tires and Brictson Treads.

(Name)

(Street, P. O. Box or R. F. D.)

(Town) (State)

CAN'T tell it from a new top after you touch it up with

"F-S" "Evernew" Auto-Top Dressing

Makes the fabric waterproof, too, yet leaving it pliable. Easily applied. Dries quickly.

Write for prices

FELTON, SIBLEY & CO., Inc.

Mfrs. of Colors, Paints, Varnishes since 1863

136-140 North Fourth Street, Philadelphia

"Evernew" Auto-Body Enamel in eight standard colors. Special shades to order.

(18-6)



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MORE MILES PER TIRE

LESS TIRES TO BUY

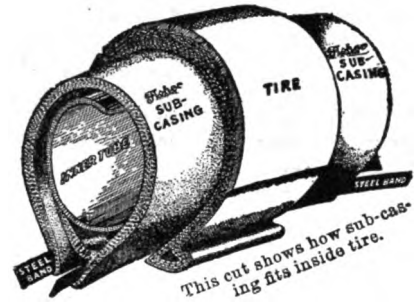
THE Fisher PATENTED "RIM-GRIP" SUB-CASING

The Blows That Your Tires Receive, When You Strike Objects in the Road, Leave Weakened Places in the Fabric

A TIRE IS AS STRONG AS ITS WEAKEST POINT

The weakened places are hard to detect now, but will result in blow-outs later.

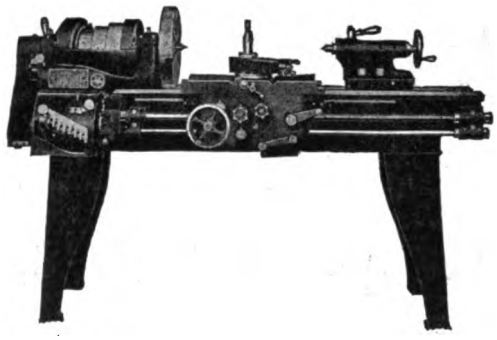
RIM-GRIP SUB-CASINGS reinforce the fabric of the tire at all points from bead to bead. They make a partially worn tire stronger than it ever was. It can be worn out completely and the sub-casing used in another tire. As the cost of equipping a car with new tires is much greater than last year, it will pay you to investigate Rim-Grip Sub-Casings.



This cut shows how sub-casing fits inside tire.

Write for Particulars

FISHER MANUFACTURING CO.
1812 St. Clair Avenue **Cleveland, Ohio**



14"x6' Monarch Lathe

Other Sizes, 16, 18, 20-Inch

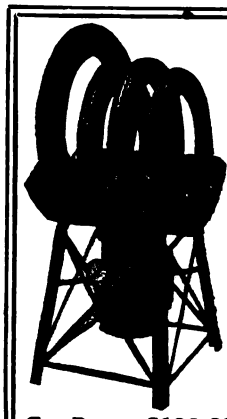
Monarch Lathes are very accurate, rigidly constructed, modern in design and quick and easy to operate. They are recognized by the Automobile Repairmen as the best lathe for Garage use.

Monarch Lathes are low in price and within the reach of every garage owner. They are used in every class of work from the finest toolroom work to production work in the largest factories.

Furnished with taper attachment, milling, keyway cutting and gear cutting attachments, and other attachments useful in the Auto Repair Shop.

Send today for catalog No. 11 and prices

THE MONARCH MACHINE TOOL CO.
SIDNEY, OHIO



Gas Burner $195.00

Extra Ply Tires & Tubes

Best Quality
Lowest Prices

Sales repeat for Exclusive Jobbers

More Fabric Means Less Blowouts.

Free — new 84 page "Red, White & Blue" catalog and tire prices for the asking.

4-Cavity En Bloc Retreader places ribbed tread, all sizes casings, 2½ to 5½ inches inclusive.
Single cavities also.

Miller's Vulcanizers are Standard

Wrapping machines and all supplies.

U-Buy Miller's Finally!
Why Experiment?



Complete Gasoline Burner $168.00

Write today, Department "H"

CHAS. E. MILLER, Anderson, Ind., U.S.A.
1894 — Established 25 Years — 1919



METAL HOSE AND TUBING CO., BROOKLYN, N.Y.
229 Tillary Street. Write for Our New Circular

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NO CARBON - MORE POWER - LESS FUEL



POPULAR SIZES 50c
Gives Results No Other Ring Can
Guaranted Satisfactory, or Money Back.
Write for free booklet A-2. Sold by leading jobbers

"NO-LEAK-O" PISTON RING CO.
AUTOMOBILE ACCESSORIES CO.

Balletin No. 5

REFUSE

It is said gasoline contains about 20 per cent. coal oil. This coal oil will not vaporize under normal conditions. It works past the piston ring down into the oil pit, weakens lubrication and if not emptied frequently, the crank-shaft bearings are injured.

By reversing our top ring (groove part up) this coal oil attempting to pass is trapped in the groove. (See Letter A.) On the firing or power stroke it is drawn into the heated firing chamber by capillary attraction It will then be exploded into power; or go out the exhaust pipe and not down in the oil pit, injuring lubrication. **No other ring accomplishes these results.** This reversing of the top ring increases the compression and power of the motor, because the film of oil caught up by the square edge, on the compression stroke, makes a more nearly perfect "Oil Seal."

Mr. Repairman, Listen! This is Your Harvest. Don't Neglect It.

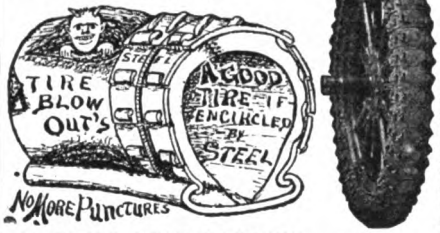
There are over 4,000,000 automobiles in the United States, say nothing of commercial trucks, tractors, etc. Old cars are being rebuilt. *War or no war* they must be kept running. "No-Leak-O" "oil SEAL ing" Piston Rings are *unlike anp other ring* on the market. Simple, *one piece*, tough and springy, easy to install, not liable to break, and popular in price. *Send a trial order at once.*

LOOK OUT FOR BULLETIN No. 6

Sole Manufacturers **824 W. North Avenue, Baltimore, Md.**

Hang on to your old tires. They will last as long as you live if covered with steel. **The Kimball Steel Protector** makes **Blowouts, Punctures** and **Rim Cuts impossible.** A few sections will hold any old blowout. Tires as flexible as ever.

Special inducements to those in new territory.



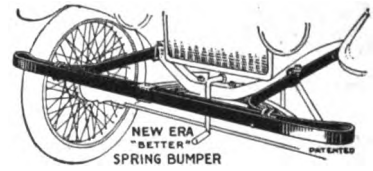




MUD CHAIN can be put on in a jiffy with one hand while standing on the run board. If you get in a mud hole you will laugh out loud. Hook the ends together and pull the little lever and they are on tight. Good for blowouts.

KIMBALL TIRE CASE CO., 174 Broadway Council Bluffs, Iowa

New Era "Better" Spring Bumpers



Double front bar full length, 1¾ x 5/16 inch spring steel has great resisting power, is light, strong and neat, guaranteed against damage or defective parts.

Made to fit all cars. For sale by first-class dealers everywhere.

NEW ERA SPRING & SPECIALTY COMPANY
1171 Hamilton Avenue, Grand Rapids, Michigan



The HEINTZ AUTOMATIC ELECTRIC-STEAM VULCANIZER

will add a money making department to your business.

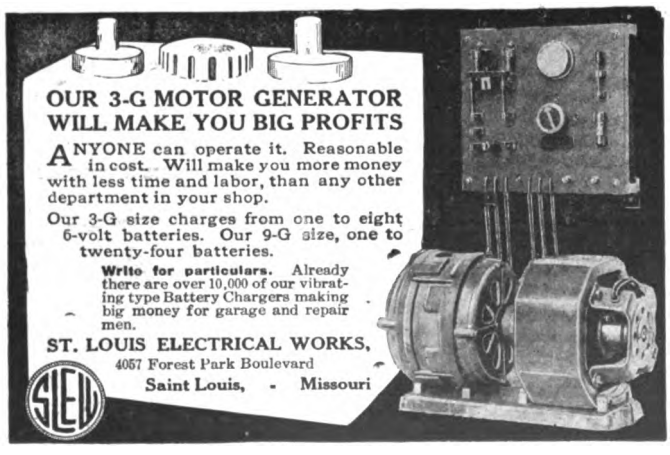
For Tire Shop, Garage or Repair Shop

Operates from any lighting socket by merely attaching plug. Steam is generated quickly by electric heat and then automatically maintained at any desired pressure. No attention required. No experienced help required. No blaze or flame. Anyone can operate our equipment. Made in three sizes.

Write for prices and further information

JAMES C. HEINTZ & CO., 2073 East 9th Street, Cleveland, Ohio

Canadian Distributors, CANADIAN FAIRBANKS-MORSE CO., Montreal, Que.



OUR 3-G MOTOR GENERATOR WILL MAKE YOU BIG PROFITS

ANYONE can operate it. Reasonable in cost. Will make you more money with less time and labor, than any other department in your shop.

Our 3-G size charges from one to eight 6-volt batteries. Our 9-G size, one to twenty-four batteries.

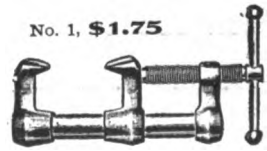
Write for particulars. Already there are over 10,000 of our vibrating type Battery Chargers making big money for garage and repair men.

ST. LOUIS ELECTRICAL WORKS,
4057 Forest Park Boulevard
Saint Louis, - Missouri

Knowlson Spring Spreaders

Both Guaranteed. Either or both Delivered.
Your Money Back if You Want It.

No. 1, **$1.75**



Fit Any Spring Easy to Operate Both Drop Forged

No. 3, **$1.25**



Nickel-plated and polished.

Gun metal yoke, screw and handle nickel.

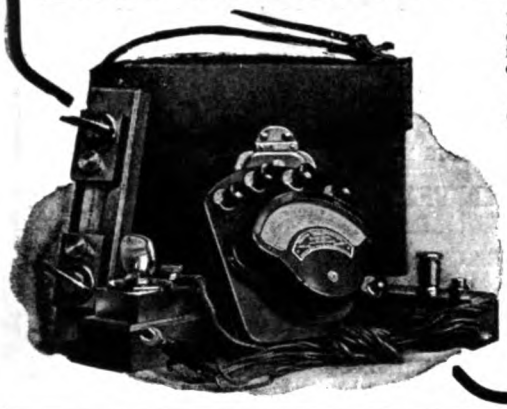
A LITTLE CARE GIVES YOU 100% EASIER RIDING. STOPS THE SQUEAK AND ELIMINATES SPRING BREAKAGES DON'T RUIN YOUR SPRINGS BY NEGLECTING THEM.

At Your Dealers, or Sent Direct.

SPRING LEAF LUBRICATOR CO., 1000 Forest Ave., Ann Arbor, Mich.

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BIG MONEY IN ELECTRICAL REPAIRS!



If you cannot repair electric starting and lighting equipment intelligently, your customer will go elsewhere for this service. He will take the rest of his trade with him. There is more money in electrical repairs than in any other department of the garage business. The demand is enormously increasing.

Weston Model 280 **GARAGE TESTING INSTRUMENT**

is the best, the most reliable and therefore the cheapest electrical equipment for you. It enables you to determine promptly and accurately the condition of the electrical equipment of any automobile, just where the trouble is and just how to remedy it.

Write for our *Special Proposition.*

Weston Electrical Instrument Co., 2 Weston Ave., Newark, N. J.

Branch Offices in the Larger Cities.

BUNTING BEARING BRONZE B.B.B.CO.No1

THIS WINTER more cars will be overhauled than ever before. Be prepared for speedy work. Time is money. Bunting Cored Bars are same quality as in our finished product used by leading manufacturers. Get a supply now

All Jobbers and Dealers

Ask for Catalog X

THE BUNTING BRASS & BRONZE CO.

740 SPENCER STREET TOLEDO, OHIO

CORED BARS

STOCK SIZES

Piece No.	Outside Diameter	Inside Diameter	Length	Approx. Weight
A	1	½	12	2
B	1¼	½	12	3½
C	1½	¾	12	5
D	1¾	¾	12	7
E	2	1	12	8½
F	2¼	1¼	12	10
G	2½	1½	12	11½
H	2¾	1¾	12	12¾
I	3	2	12	13¾
J	3¼	2¼	12	15⅛
K	3½	2½	12	17
L	4	3	12	21
M	4¼	3¼	12	20

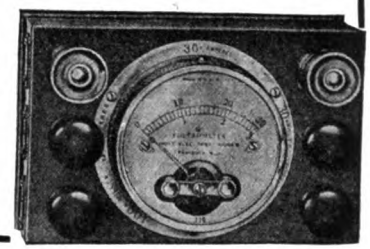


GOOD NEWS ABOUT A NEW INVENTION

A highly improved miniature portable measuring instrument, 4½ inches by 3 inches by 2 inches high. Displacing all the old conventional types of Voltammeter.

The Hoyt Rotary Meter

may be used to determine the output of the generator, the rate at which the battery is discharging, the current consumption of each individual lamp, the entire lamp load, the condition of the wiring, the voltage of the storage battery, the voltage of each individual cell, the current required for the starting motor. It will detect leaks, grounds, short circuits or open circuits in armatures, fields, or commutators, of motors or generators. It will do as much as that—so get the particulars today.

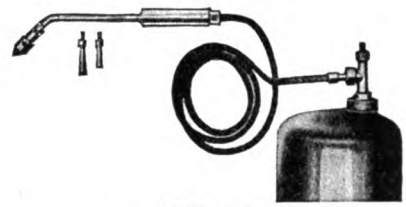


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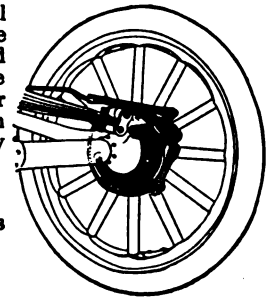
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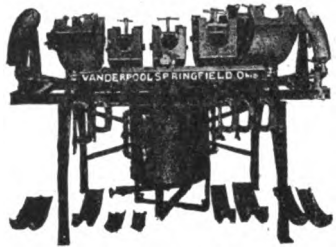
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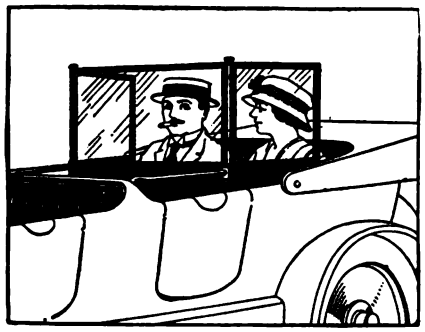
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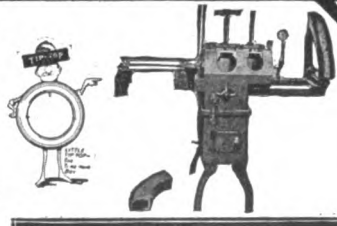
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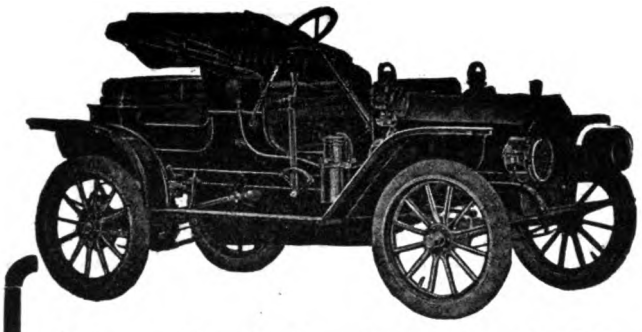
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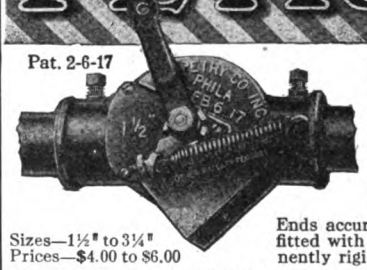
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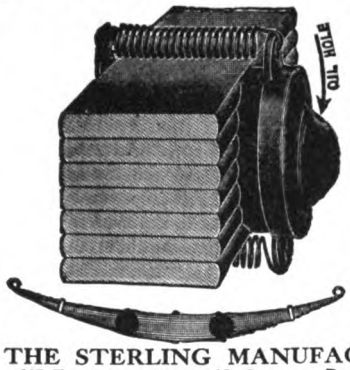
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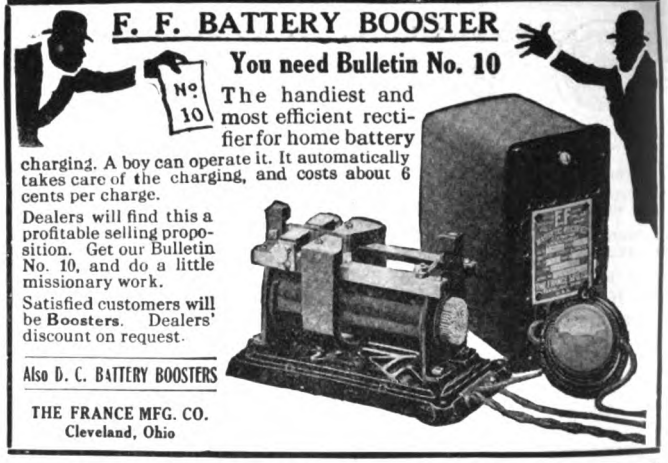
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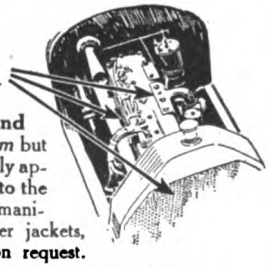
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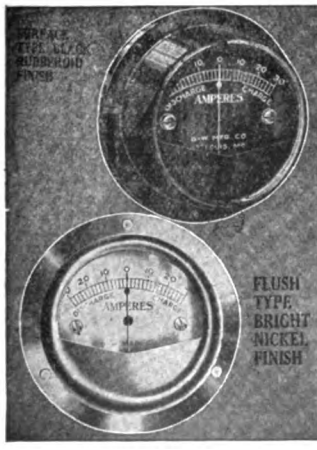
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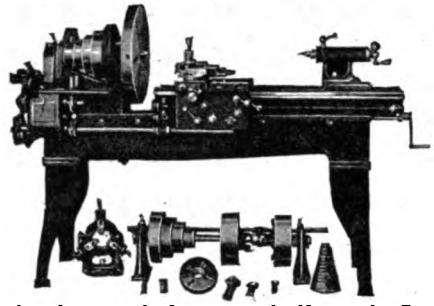
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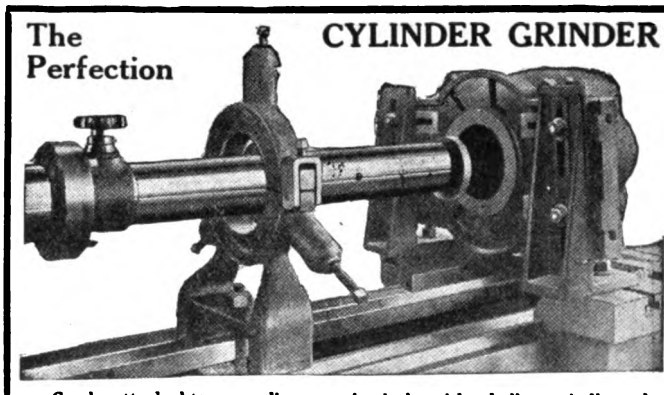
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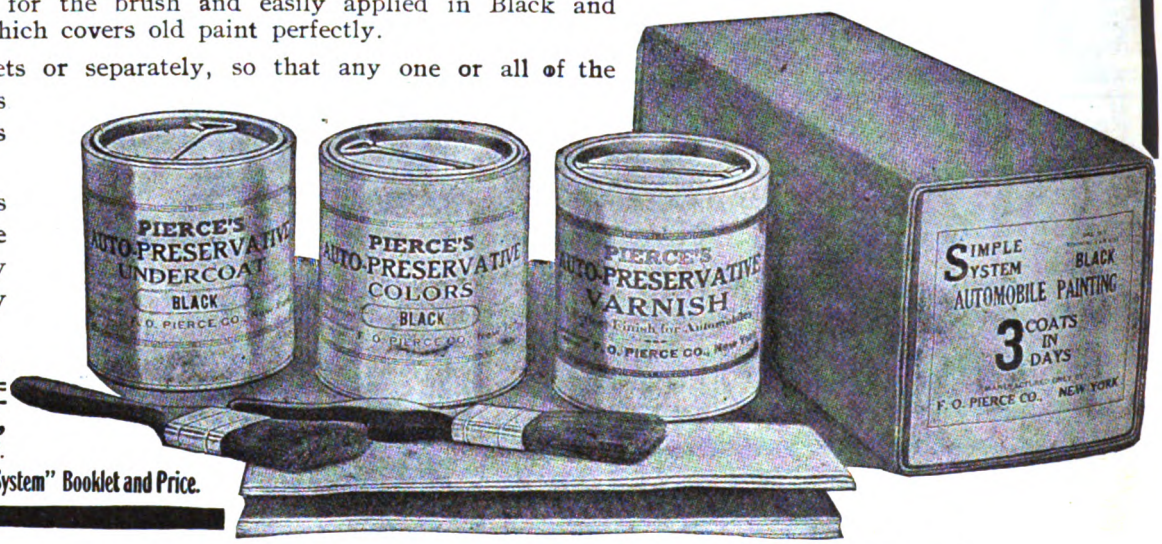
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KEEPING JIM ON THE JUMP



In ancient Greece, there lived a man with whiskers long and white; a sage of wit, but ridiculed, he slept in tubs at night.

This ancient man, so history tells, had one peculiar passion; to find a man of honesty, became his one obsession.

From morn 'till night, Diogenes (that was his name you've guessed), on highways wide, in alleys dank, pursued his fruitless quest.

A lighted lantern in his hand, a frown upon his brow; the old man wandered on and on and hunted high and low.

In rich man's house, in poor man's dive, the sage could oft be found; his search he never ended 'till he slept beneath the ground.

* * *

The memory of that ancient man long since has passed away; but still a question vexes me,— "Does virtue thrive to-day?"

Had that old sage immortal life would he have reached his goal? Could he have found in this fair age a man with honest soul?

I doubt it much, my wager's great that old Diogenes would long ago have ceased his search and rested his old knees.

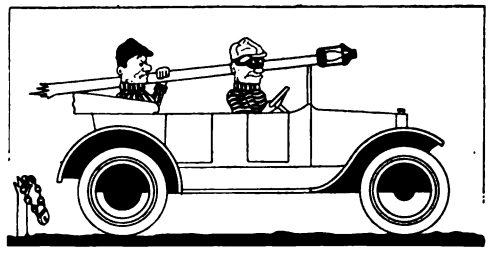
Permit me, now, to change a bit an adage old and clever: "Though wise men come and fools may go, the thieves go on forever."

* * *

IF I chose to delve into the musty past I am sure that I could convince the average reader that dishonesty is as old as history and that it has flourished since time immemorial. Just to show you what can be done in the way of proof let me refer to the book of Genesis. Is it not faithfully reported that our old forefather Adam purloined an apple from the orchard? Well, that was only the beginning.

As we turn over the pages of the book, we find tale upon tale of wars and trouble; Solomon had his vices, Isaiah made mistakes, Saul was possessed of the "itching palm," and soon we are forced to admit that every age has had its troubles.

Old Diogenes probably was the first man to investigate human nature to such a great extent and take his findings much to heart. His search was so unique and so different that a note was struck and the tone has vibrated down through history until to-day.



Men who were not so philosophic by nature flourished in Diogenes' day, in all probability they owned their palaces and had their diamonds, simply because they took for granted that they must look out for the thieves. But poor old Diogenes! There was a man to be sorry for! Had I the gift of Mary Pickford or Norma Talmadge, I would weep a tear for the old man, possibly I would squeeze out even two or three pearly drops, for Diog. certainly needed sympathy.

I can picture his look of trust, his patient and serene face as he plodded about his endless task. Shorn of everything but his old

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rusty lantern and his sleeping tub, he wandered around, putting his trust in human nature, only to meet with disappointment wherever he went.

It is a lesson to be taken to heart, a horrible example. Picture in your mind what might happen to such a trusting mortal were he to be placed in one of our towns or cities to-day. Some healthy and robust youngster would seize and make way with his tub, before Diogenes had gone more than a block from the station. The young-

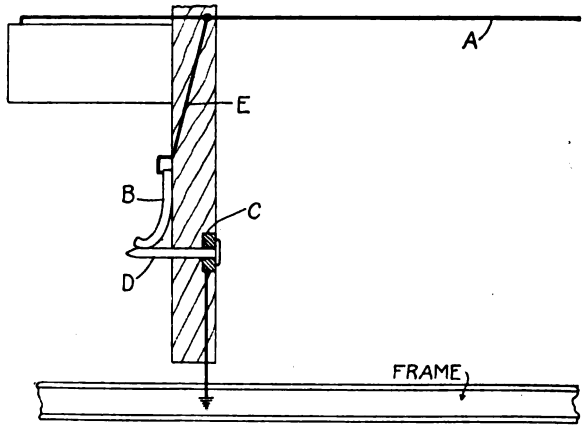


Fig. 1—The Easiest Way To Discourage the Thief Is To Short-Circuit the Coil.

ster would doubtless use the tub as a boat or perhaps a roof to his rudely constructed shack.

After traveling two blocks, Diogenes would miss his rusty lanter, a junk dealer, in passing might snatch it from his hands. The old clothes man would soon acquire the old philosopher's raiment and if Diog. were a deep sleeper he would awake in the morning to find that during the dark hours an enterprising wig maker had purloined his luxuriant whiskers, mayhap his hair also would be missing. The morning papers would contain the scandal, covered by a line in the police reports. You and I, brother reader, would smile to ourselves and snicker, we would think to ourselves, "Another lamb fleeced—poor fool," and the old world would keep right on running.

But "Pride goeth before a fall" and soon you and I, brother reader, might stub our toe and dislocate our nose upon the asphalt paving. We might trustfully leave our shiny new Fierce Sparrow or our pretty new Appleson car beside the curb while we visited a friend in town and when we returned find nothing but a grease spot or the track left by four non-skid Fearsome tires.

In old Diogenes' day the thief was content if he could purloin a nose-ring or an ankle bracelet, but the "Jim" of modern times is after bigger game, he is modernized and keeps up with the times.

Now before you read any further I want to impress one thing upon your mind, I'm not going to give you a receipt for preventing theft—there is no such thing; I'll just try to tell you, as the title reads, how to keep "Jim" on the jump.

If Jim wants your car, he'll take it, you can remove the wheels, take out the engine, drink the gasoline and chain the auto to a post, all in vain. Jim will come along, make a careful inventory of the accessories and decide whether or not the "Game is worth the candle," to borrow an old saying. If the answer is "Yes," your little car will be advertised as lost or stolen and you will collect the insurance.

Perhaps Jim will add insult to injury and take the lamp-post as well, just to show you how easy his job really is. Right here let me warn you of one thing, for goodness' sake don't chain the axle of your car to a lamp-post for if you do Jim will remove a wheel, slip off the chain and when the wheel has been replaced, drive away your little pet.

The Best One I Know

First, I'll give you the best thief discouraging method I know; there is really no absolute, guaranteed, ironclad thief preventive. Hire a chauffeur to watch your car, hire a footman to watch the chauffeur, pay a butler to watch the footman, interest your wife's maid in the butler, secure the services of a boy to keep tabs on the maid, and watch the boy yourself. It costs money, but it's worth it if you own a real car.

Of course if you own a cheap car, one of the kind that you can pick up for a couple of thousand dollars, you really should depend upon cruder methods. I once had a friend who invented the best thief discourager that I have ever seen. He connected the starting button with a small electrical device and a secondary coil in such a way that when the button was pushed in a spark would occur in the gasoline tank. Yes, it worked to perfection. Bill forgot to turn off the switch one day when he started the car himself, and when matters were care-

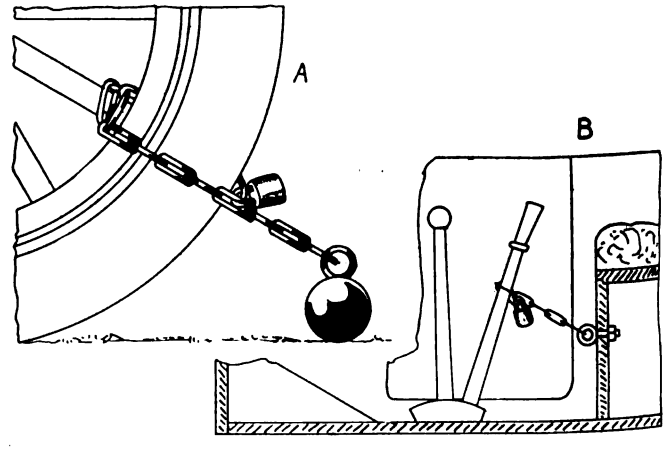


Fig. 2—A Heavy Ball and Chain, Swinging with the Wheel Would Attract Attention. At B Is Shown Method of Fastening Lever.

fully explained to the fire insurance company they wouldn't listen to reason and refused to pay on the policy.

Bill always contended that his device worked, everyone admitted it, and you will admit that there was little chance that the car could have been stolen. Bill has a number of similar schemes and should any of my readers want more details I will be glad to supply them.

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Perhaps, however, you do not carry insurance upon your car, perhaps you have a conscience and in such a case the device such as I have mentioned will not answer the purpose. Just glance at Figure 1 and see just how a somewhat similar arrangement may be made.

In Figure 1 the wire A leads from the ignition coil to the battery or ignition switch. Should this wire be grounded, then the ignition coil becomes inoperative. Therefore let us connect this wire, through the wire E

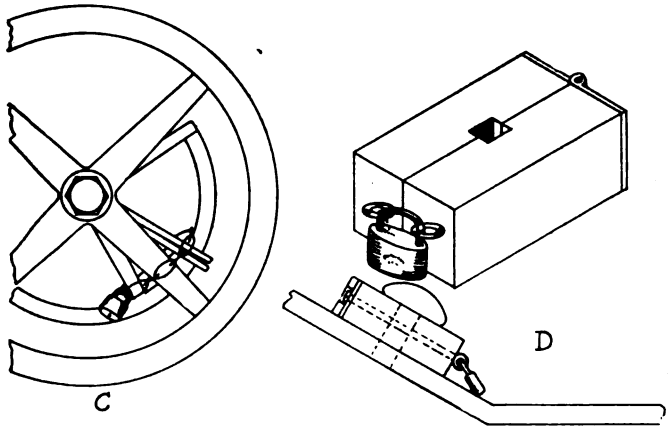


Fig. 3—C, Illustrates Spark and Throttle Levers Locked; D, A Block of Wood Locked Beneath the Starting Button.

to a small strip of spring brass, B, making the connection inside the dash so that it will not be noticed by the casual observer.

On the opposite side of the dash, inside, we will sink a small washer, C, which is just large enough to permit the insertion of a nail, D, and then connect the washer C with the frame, through the dashboard if possible.

Should the ignition switch be turned on, all the ignition current will short circuit through the frame if the nail D is in place and the engine cannot be started. When the owner wishes to start the car, he simply removes the nail, turns on the switch and starts the engine.

With a few variations the same scheme may be used in a number of ways. For instance, instead of connecting the washer C with the frame, connect it with the horn, or a special electric bell. As soon as light-fingered "Jim" turns on the switch, buzz goes the alarm and "Jim beats it while the going is good."

Locking the Ford.

If you are so fortunate to own a Ford car, you will adopt about the same methods. In such a case, however, you will connect the wire E with the wire which leads to the magneto terminal, or better still with the ignition switch bar.

You surely can have a lot of fun with "Jim" if you choose, especially if your car is one that has to be cranked by hand. Just change around the secondary or spark plug wires, or disconnect the linkage between the spark advance lever and the ignition timer or distributor. When your friend tries to crank the car he will be surprised to receive a broken wrist or a sprained back.

Bear in mind, however, that you car is not an animate object; it knows no master and is just as ready and willing to kick you as the thief, no matter how kindly you treat it.

Where the car is fitted with a single coil and distributor system, a discouraging factor for the thief is the loss of the distributor brush. The owner can easily lift off the distributor head, remove the brush and replace the head again. The thief will not find it easy to put in a new brush, though he can, of course, tow away the car.

As I have hinted before, you may mix up the ignition system or shut off the gasoline, Mr. Thief will find some other way of running away with the car if he wants it hard enough.

In Figure 2 there are given two discouragers that are very effectual. The one shown at A is borrowed, not original. It is similar to the method used in preventing prisoners from escaping, back in the dark ages. It is simple enough, nothing more or less than a ball and chain, locked around a wheel of the car. But just try to run the car with the ball attached, you will make such a clatter and racket that you will be fully persuaded as to its effectual operation.

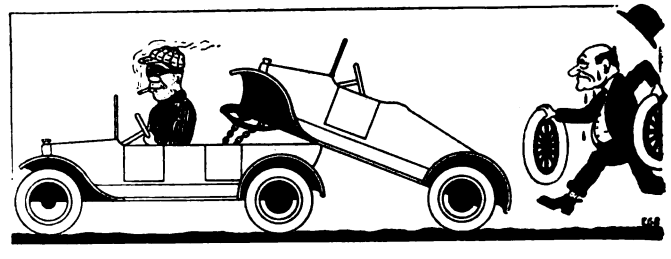
I have in mind a similar device which can be obtained on the market, a wedge-shaped iron which locks around the tire. The car can be moved a short distance, but not operated very satisfactorily unless the device is removed.

At B in the same figure is shown a popular locking method. The emergency brake lever is held back against a staple or eye-bolt fixed in the seat. Personally the writer prefers to lock the gear-shift lever into high speed by the same means, but in such a case, if there are two thieves, the clutch can be held out while the other cranks the engine, and the car started on high speed, if the engine is powerful enough.

A Clever Lock.

Not long ago I noticed a clever locking arrangement which appeared to be about as effectual as anything could be. The owner had placed a large eye-bolt through the front axle, near to the left wheel spindle. He had the eye-bolt welded into place so that it could not be removed. When the car was stopped, the wheels were cramped around to the extreme left and a padlock applied around the wheel spindle arm and through the eye-bolt.

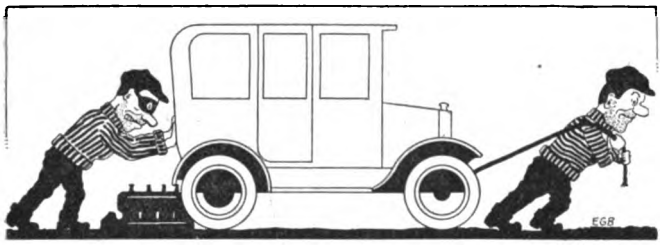
With such an arrangement "Jim" might run the car for miles, in a circle, but distance doesn't count in such a case, for if one were to notice a joy-rider driving a car in a circle for half an hour or so, one might be apt to ask a few questions.



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One of the best devices that I know, which seems to be fairly thief-proof, is arranged to be applied between the carburetor and the intake manifold. It operates an auxiliary butterfly valve in such a way as to cut off the mixture when the car is not in use.

If the reader does not care to purchase such a device,



he can accomplish the same results by locking the gas and spark levers to the steering wheel as shown in figure 3 at C. If he is mechanically inclined, he can easily disconnect the throttle linkage near the carburetor and apply a padlock to that point in such a way as to shut off the butterfly valve entirely.

In figure 3 at D is shown a novel, though not very practical device. It simply annoys the thief for a few short moments, and is effectual only if the car is not equipped with a hand starting crank. The device is nothing but two wood or iron blocks locked around the starting pedal. There are many devices which can be applied in the gasoline line between the carburetor and the tank, but they do not work satisfactorily, simply because the thief can rig up an auxiliary tank to hold a quart or so of gasoline within a very few minutes.

Now I have done my duty—I have warned you against the thief, I have shown you how to annoy him and how to protect your car to a certain extent. So if your little machine should wander away from its cosy home and its kind parent, don't try to blame me, I just won't stand for it, that's all there is to it. I don't want you to send me a letter like the following either, I wash my hands of all responsibility.

Dere Sir:

All them things you told me about to do for thieves I did; but it makes no difference. Yesterday I left my car out in front of my shop and a steam roller came along and squashed it flat. I can't find the car at all, nothin' but some pieces of iron and leather. What can I do to stop this happening in the future as I don't want to take no more chances? Steam rollers don't pay no respekt to a locked car like thieves do.

Hi Jinks.

The Spring Window Display

If the Beholder Catches the "Spring Fever" From Your Show Window, He Will Surely Purchase Auto Accessories

BY FRANKLIN MYERS

WHEN you consider that the store window is space that you pay for in cold cash every time you pay your rent, it is really worth while going to some extra trouble, if you wish to call it that, to fix up so that it will be attractive enough to bring in customers. Nowadays the public has become so used to seeing good window displays and good show cards that unless the retail accessory dealer keeps up with his fellows, he is liable to be distanced in the race.

Make the Show Window Pay Its Way

There is no good reason why the average accessory store on the average avenue should not get down to real business methods and make the show window pay its way. There is an inexcusable lack of interest hanging around loose somewhere in the store carying what sign men call a dead window—and the business done is generally proportionate to this same lack of interest.

Can anyone tell me how, where and why the accessory dealer ever got the idea that he couldn't use decorative displays in his windows the same as a druggist, a department store or a sporting goods house? Imagine what these folks think of their windows—let a little light permeate that solid ivory dome—get wise to the fact that as an auto accessory dealer you have been already distanced in the race so far as attractive windows are concerned. I don't mean to be discourteous—but a brickbat will wake a real man up quicker than a bouquet!

The estimated value of the window in the great New York stores contains big figures. Macy's windows are said to be worth $100,000 a year, or one-fifth as much as the expenditure for newspaper advertising. A Fifth Avenue shop, near Thirty-fourth Street, values its six windows at $40,000 a year. The Wanamaker, Philadelphia, store justly values its windows at not less than $75,000 a year.

Lord & Taylor's window in New York is made so that it will descend bodily to the floor below, where it is dressed and then raised to the street level by means of machinery. One of these large window displays can be assembled and put in shape for the public view in a few minutes, a small army of men being ready to make the change below.

These few facts are mentioned that you may get some idea as to how show window values have grown in the last twenty-five years.

It pays to take the extra time to arrange good window displays—the man in trade who treats his business

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as a pet hobby has the advantage every time because his heart is in the work and it's bound to tell.

Every window display is the store's smile. This smile will show out through the store window and into the hearts of other folks. People patronize the merchant who exhibits a keen interest in his own business. He exhibits his interest in the form of clean choice pictorial show cards, or posters, or clever window displays and that interest is catching.

Folks figure that a man so fond of his business must be the man who naturally would study the interests and welfare of his customers—and they find that this is so—it is the truth and truth is mighty. It compels us often to live whether we will or no—it makes us be square with ourselves and our neighbors—it compels us to go to our work gladly and happily—it compels us to clean up—brush up—to look nice and to want nice things.

Stores Known by Their Windows.

Men are known by the company they keep—stores are known by the windows they keep. This is just as sure as anything can be.

Get busy with your store window, Mr. Retailer—don't hang fire and wait around to see what the other fellow is going to do with his. You may have an advantage over him anyway by being handy with brush and pencil.

Who cares a rap for the store with dirty windows and an exhibit of goods that look like a mess of scrambled eggs—who cares for the merchant who has a store with "We don't care" written all over it?

The store window is the greatest local advertising medium the accessory dealer has—and any concern that does not advertise to the full capacity of this medium impresses the public as merely an experiment. The fact that your shop or store may have been in existence for many years does not help it so very much in these times. The public may look at mere existence for a long term of years as a disqualification, indicating preference for old-time methods.



This Cardboard and Paper Cut-out Is to be Reinforced by Wood Strips Glued on the Back of the Branches—Suspend in Window on Three Wires Securely Fastened in Screweyes at the Top.

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One store man said to me the other day that he had "never been educated up to it"—meaning, of course, good window displays.

Education is not confined to the ultimate possession of the much-coveted high school parchment or diploma and feeling in that piece of evidence lies our claim to culture. (Not the German brand.) Education is a matter of learning every day, and as we go. It is a matter of imbibing knowledge every day, of learning by each hour's experience, of adjusting ourselves to circumstances as they rise and of growing to meet the needs of a growing work.

There is no more comparison possible between the work of the display manager of the present day and the old-time window dresser than there is between the ways of doing business that are used by the big department stores and the cross-roads merchant. Pretty nearly everything in the work has been changed in one way or another, and I think that everybody will admit that the change has been very much for the better. Window displays are now as essentially valuable from an advertising standpoint as publicity in the press.

I am fully satisfied that I can venture this one point—that if the auto accessory dealer does not pay more attention to these special window attractions he will see



the day when the department stores will take over his business—or at last make big inroads into it.

I am not talking about how you place your goods in the window—anyone can do that—I am talking about timely attractions that bring the crowds—for instance:

Special selling booths are becoming popular for all special occasions—and spring is a special occasion if you please—if you will but make it so. I have created a spring selling booth that can be built at very moderate cost, a sketch of which is shown herewith, and if you have a bundle of enthusiasm lying around loose, or lying dormant, get at it. Bring it out of its hiding place, and enthuse over one of the most beautiful attractions possible.



The entire frame work of this booth is built of wood scantlings and strips braced at proper points. Any good sign man or handy clerk will know what is wanted if shown this sketch. The booth can be made square or long shape, as here shown. The bottom part is enclosed with unbleached muslin, painted green. The counters of course are of ordinary boards covered with light green crepe paper. There are four posts to hold up the top of booth, and criss cross lattice-work on top as a roof, to which all card board pieces are to be tacked.

The tree trunks and limbs are cut out of old card board boxes and glued together. You do not have to be particular with this part of the work, for over the three trunks and limbs must be wrapped gray crepe paper to give the appearance of regular trees. The card board tree trunks you will notice go around either side of the upright posts at each of four corners.

At the top you will notive a broad gray band—that is sky blue card board—a band of it all around the booth and is put there to give a suggestion of blue sky. Cut out odd zigzag pieces of white card stock, large size, and touch on with a one-inch brush spotty dashes of medium pink aniline color to represent a blossom background.

You will probably need thirty or forty of these pieces and they must be tacked on the lattice work at the top—

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the largest pieces in the centre, and graduating at sides and ends. But before tacking on these pieces it is advisable to stick on to the white cardboard pieces numerous cut-out blossoms. There is a glazed paper on the market which comes in tints and colors.

You will need about 10 sheets of light pink, 10 sheets of white, 10 sheets of light green and 10 sheets of strong pink. Cut the paper up into squares of three inches. Take four or five pieces at a time: fold them twice into a smaller square. Take the scissors and cut a half circle around the open edge of paper, and then separate the pieces.

In this manner you will be able to obtain good "live" blossoms to be touched on (with glue) to the cardboard pieces before tacking them up. Hide the sharp edges of the cardboard pieces by glueing blossoms to those exposed parts. The whole top of the booth can be built, blossoms, branches and all, before putting up, if so desired; in fact it is the convenient way to operate.

The tree trunks and lower branches can be adjusted to the booth after the top piece is put on and the blue sky band is in place.

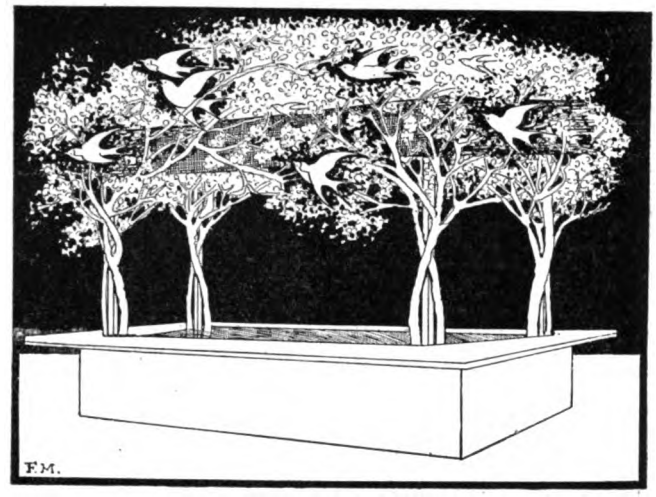
The birds are to be cut from yellow and red cardboard and attached to booth by wire so as to keep them from looking as if they were glued on.



Some store and window cards are shown in this article.

I believe in cards that carry an idea that will impress a fact—such cards are remembered—it is advertising that is never lost—but really cumulative. Folks will return after many days and ask for some certain article through the fact of having carried with them a certain Idea picture that compelled their notice to the point of remembrance—that is the mission of the Pictorial Window Card.

The text of a card is sure to be read if the eye is attracted first by a striking illustration done boldly in black and white—this is the key note—a weakly drawn picture does not carry a forceable impress to the mind and is fit only for the waste basket.



Spring Selling Booth.

Sales clerks who desire to make their own pictorial cards may do so by making use of the able little pantagraph for enlarging small pictures to regular card size. Full directions come with each instrument.

BE CAREFUL.

Gasoline is good for cleaning gloves and garments of all kinds and with so many cars in use gasoline is very accessible. Lots of people use it with no thought of the danger they run in so doing. A writer in the New York Tribune in considering the matter of fires has this to say:

"Don't try to save 10 cents by cleaning your gloves with gasoline, naphtha or other cleaning fluid and burn your house down in the process. Many women do and disfigure themselves for life in the bargain. The annual prey in this country of home cleaned garments is 3,000 homes burned and over 500 women burned to death, besides twice that number so injured that they carry ugly scars. Is it worth while? If you must use cleaning fluids at least do so out of doors, and keep them stored in a metal box outside the house. Fire caused in this way should be covered with sand or soda."

It is to be hoped that every reader of the Automobile Dealer and Repairer will caution his women folks or have them read this article. It may save much suffering perhaps and a number of lives.

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When Does Welding Pay?

BY DONALD A. HAMPSON

THE automobilist who is confronted with a broken part from his car—a part that is expensive to replace or that involves more or less delay in getting a new piece—straightway thinks of having the broken part welded. The marvelous things he has read about and the good "fixes" he has seen quite naturally have built up the impression that welding is the panacea for breaks.

And the garage man who has a welding outfit in his equipment is alert for chances to make use of it; he may be perfectly sincere in his recommendations but may make mistakes in trying to weld anything and everything, simply because he has not a broad knowledge of the materials of construction. A few words of warning and suggestion as to when not to weld will follow.

The best welder the writer ever knew turned down more jobs than he accepted. He was conscientious and had a thorough knowledge of metal working, he temporarily offended some customers by refusing to weld parts on which they were "willing to take the risk" but these same customers became his strongest boosters after they had had the work done elsewhere and it had proven too weak for automobile stresses.

"Welding is the greatest aid the repair business has ever known," he would say, "but to be successful you have got to learn to say 'no' when you run up against jobs that wont be lasting ones, and your machinist's experience must tell you which they are."

To Weld or Not to Weld That Is a Question.

* * *

Whether it is better to turn away a dollar's profit, or be honest and thereby save your reputation for turning out a job that lasts as long as the machine itself.

All common metals can be welded. It is the element of heat which works the havoc with automobile parts—the heat of welding is so great that it softens and hardens parts on the one hand and it warps castings having accurately machined surfaces on the other hand.

Thus in the first case, the part (which may be a gear) will have a soft section of decreased strength and poor wearing surface, in the second case, a crank case, for example, may be so badly warped that the cylinder face will require re-planing and the bearings all need to be fitted anew. Ordinary common sense demands a survey of these to-be-expected conditions before the welding is authorized—then a very little figuring will show wherein lies true economy.

Cylinders and crank cases *are* welded without any warping or other harmful effects but in the main, such jobs are the work of specialists who have unusual facilities and are thus able to counteract the ill effects of welding heats—a parallel case is that of the great hospital which can make a success of a difficult operation that would be folly to attempt in the office of a country doctor.

Unusually skillful men can sometimes accomplish the near-impossible; I recently saw an Overland rear axle shaft that had broken off clean at the square while the owner was on a trip, had been welded by the owner as a chance on getting home, and had run 1200 miles before breaking in the weld—but this man admitted it was only luck and that he would not think of doing such a thing for a customer.

Case hardening, spring temper, oil temper, toughening—these are names that cover various forms of heat treatment applied to steel parts to bring out a maximum of strength or wear, that maximum being required in automobile service. A weld in any such parts is a waste of good money and an invitation to further trouble, possibly disaster. Any heat over 500° will soften the parts and nullify to greater or less extent the benefits of original treatment. The welding heat is several thousand degrees, and this necessarily spreads a short distance each side of any break.

Aside from the softening of adjacent portions, the material of the weld itself is not the same as the rest, usually not nearly as good. Some misguided individuals build up gear teeth by welding on—as well resort to the common repair on light machinery of putting in a couple of pins in place of a tooth.

And we even see spring leaves welded! There is only one way to properly repair a break in such a heat treated part—that is, to use a welding material of the exact same composition as the original piece, to make a weld which is perfect clear through and as strong as an unbroken part, and then to give the entire piece the identical heat treatment that it received at the factory in the beginning—and it is impossible to satisfy all these conditions in more than one case out of a thousand.

Welding *can* be of great practical value in the automobile repair business. Specialists and honest, skillful men can do wonderful things with major parts, and unimportant parts can be welded successfully by beginners.

But the dabbler, who has added welding to his box of tricks that included everything from car washing to electrical repairs, "welds" by sticking on gobs of metal producing a job that may look secure and may carry around the block, but is useless for a permanent repair as so much solder dropped on in the same way.

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The Care and Repair of Tires

Part 2.—How to Keep Tires in Condition, the Importance of Proper Inflation and Storage.

Copyright, W. E. FABER*

POSSIBLY the fact that tire makers have placed guarantees of from 3,500 to 5,000 miles on their product has led the average car owner into the mistaken belief that the guaranteed mileage is about all he has a right to expect and that any service he receives in excess of this guaranteed mileage is due either to exceptional tire quality or exceptional good luck.

While that may be an optimistic way of looking at the situation, it should be remembered that no matter what mileage may have been secured from a tire that has been allowed to go without attention or care until its life has ended, there is no doubt that the observance of a few simple precautions, easily within the ability of anyone, would have added hugely to that mileage. It has been well established that a reasonable amount of attention will invariably be repaid in the mileage that can be obtained from any good tire.

As an illustration, the writer recently had occasion to correspond with a number of motorists to whom a certain tire manufacturer had awarded prizes for securing exceptional mileage. All of these people had driven twenty thousand miles or more on the tires that were under observation. Some almost reached the twenty-five thousand mark. Without exception, while they admitted that the quality of the tires had had something to do with the result, they agreed that the care the tires had received was a highly important factor.

Another case that has been authenticated is of a tire that has given more than thirty-eight thousand miles and when last heard of was still in active service. In this case, too, the care that had been given was considered largely responsible.

The life of a tire should be over ten thousand miles under ordinary usage and conditions; but it is safe to say that two-thirds of the tires used are thrown in the junk heap before they have gone more than half that distance.

In this section, therefore, we shall take up in detail some of the methods that motorists have found effective in obtaining the higher figure.

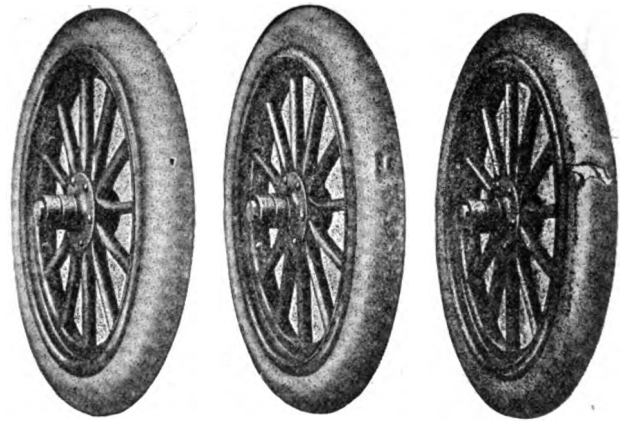
Proper Inflation.

The importance of proper inflation certainly entitles it to consideration as the first of the factors entering into the securing of the mileage that is built into a tire. Most people do not realize the damage that underinflation will surely cause. The novice is sometimes afraid of inflating his tires too tightly, something that cannot be done with a hand pump and is seldom done with a power pump.

Nothing will wear out a casing so quickly as running it with too low an air pressure. The fabric is bent and twisted so much that the threads cut each other, the rubber is disintegrated, and the tire wears out like an old leather hinge. The layers of fabric become separated—a good bump bends the casing so much that the inside layers break—the tube works itself into the crack—and then comes one of those inexplicable blowouts, often in a new tire, that makes the tire adjuster want to change places with the recording angel.

Roughly speaking, a tire is properly inflated when it will stand up full and round under the weight of the loaded car A kick at the tire tells you nothing. A tire gauge is the only sure way of knowing anything about the pressure.

Tire makers indicate on their tires the correct pressure to be maintained, and their instructions should be rigidly followed. The general rule is twenty pounds of pressure for each inch of cross section. That is for a



Three Stages of Tire Disintegration: A Small Cut Appears in the Tread; At the End of 500 Miles a Sand Blister Forms, and in 500 Miles More the Tire Blows Out.

3½ inch tire the pressure should be from 65 to 70 pounds if the tire is carrying the normal load for which it is designed.

If exceptionally heavy loads are to be carried the pressure should be increased correspondingly. Especially during the first ten days a tire is in use it should be attended to daily, for the casing stretches more or less and the pressure is thus reduced. After this period, unless the tire shows symptoms of a leaky valve or other leak, an inspection once a week will be sufficient.

There is a popular impression that the pressure in a tire should be reduced during hot weather. This is absolutely wrong. Really more care should be taken to keep the tire up to full pressure in the summer than when the weather is cool. A loosely inflated tire is subjected to so much extra bending as it passes over the

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road that it actually heats more than if it were pumped up to the standard pressure.

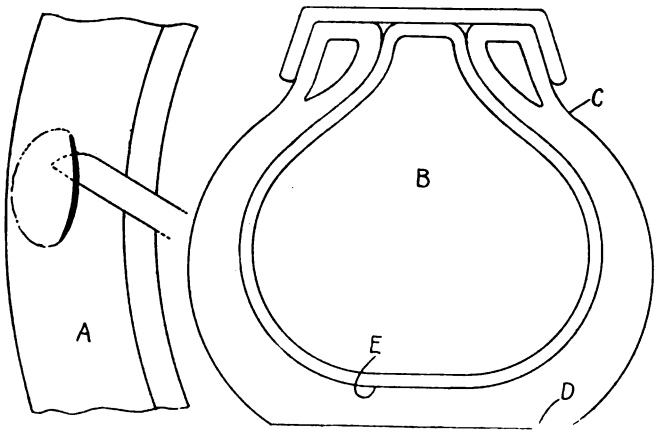
It is the heat that injures the tire by causing the rubber to lose its adhesiveness so that the fabric separates. In addition there is the danger of rimcutting, bent rims and other damage. The expansion of the air in the tire due to the heat of the atmosphere will only increase the pressure a few per cent so that there is no danger of a blowout from that cause.

One should never drive on a flat tire, even for a few rods, because there is the certainty of damaging both casing and tube, and the likelihood of skidding or loss of control. The safest way to do if caught without a spare casing is to remove casing and drive on the rim. Don't remove the rim or you are liable to have the whole wheel fall to pieces.

Remember then, as the first and most important rule for tire conservation, to keep your tires pumped full all the time.

Care During Storage.

Most motorists know that continued exposure to direct sunlight will harden and crack the varnish on their cars, but they do not always realize that the rubber in the



A, Opening a Sand Blister to Let Out the Dirt; B, Result of Underinflation; C, Tire Bends Excessively at This Point, Causing Rim Cuts; D, Large Ground Contact Means More Punctures; E, A Bump on the Road Will Bend and Break Fabric.

tires is the same sort of a vegetable product and that light has the same effect on a tire. Park your car in the shade when possible, and when it is in the garage keep the garage dark.

When a car is used only at infrequent intervals, it is a good idea to jack up the wheels and partially deflate the tires. This is done, not so much to take the imaginary strain from the weight of the car off the tires, as to prevent the weight of the car from settling down on a tire that may have a slow leak, and pinching the tube and casing. If a tire is fully inflated the pressure per square inch on the inside of it is very little different whether the car stands on the tire or is supported on jacks.

Keep in mind that conditions which will rust iron will rot a tire that has its fabric exposed either by cuts through the tread or by exposure of the inside of the tire when stored off the wheel. Moisture has no effect on the rubber, but it is ruination to the cotton fabric.

In winter it is best to remove the tires from the wheels and after being sure that they are perfectly free from oil, water, etc., wrap them with cloth and paper to keep out the light, and store them in a place where it is cool and dry. If the car is set on jacks the tires may be partially deflated and wrapped as they are on the wheels.

If the tires are taken off the wheels leave the tubes in the casings and put in enough air to keep them round. Do not hang the tires on a nail or hook as that will cause them to take an unnatural strain that may deform them badly. It is much better for the tires if you will simply pile them on the floor.

Why Wheels Must Run Parallel.

Unless the wheels are parallel the tires are shoved along the road instead of rolling in a straight line and the result is about the same as if they were pushed over a big piece of sandpaper. The treads are worn rapidly so that if a tire shows signs of undue wear in the center of the tread examine your wheels and straighten them out or have it done immediately.

A loose steering gear that lets the front wheels wobble has much the same effect. Above all things the front wheels should not "gather" or "toe out." It is better to have them "toe" in so that the front edges of the rims are half an inch nearer together than the rear. This offsets the effect of the slant that is caused by the slight deviation of the steering knuckles from the perpendicular and makes steering easier without harming the tires.

Substances That Destroy Rubber.

Light and heat, as explained before, have the effect of overcuring the rubber and hardening it. Water, when admitted to the fabric, rots it and causes it to loosen from the fabric. To a large extent it is impossible to protect a tire from these, but there is another enemy that causes more trouble than all of the others. That is oil.

Oils of various kinds are ready solvents of rubber and will rot a tire quicker than any other substance. Consequently the garage floor should always be kept clean and dry and if in oiling the car or as a result of leaky bearings oil is spilled on the tires it should be cleaned off immediately. Use soap and water, not gasoline.

What Rusty Rims Will Do.

Iron rust eats into canvas very quickly and for this reason the rims should be examined and cleaned a few times each season. Assuming that the rim is clean, as it should be when the tire is attached, it may be kept so indefinitely if proper attention is given to keep the rims straight and if the locking nut on the valve stem is drawn tight so that no water can work in through the hole in the rim.

If on inspection the rim is found to be rusty, even though merely in small spots, the rust should be sandpapered off and the rim given a coat of thin shellac. Ordinarily stove polish, which contains graphite, is also excellent for preventing rust and making it easy to remove a tire in case of an emergency.

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Any dent or bend in a rim should be corrected as soon as discovered, for if the bend is inward a great strain is brought on the bend and side of the casing. If the bend happens to be outward there is a fine chance for water, oil and dirt to work in between tire and rim.

The driver who likes to show how quick a start he can make, or who puts unnecessary strain on his tires by starting with the high gear engaged is usually the fellow who wonders why his tires don't give him the service that some of his more conservative neighbors receive. He forgets that the entire energy required to set a mass of a ton or two in motion is all concentrated into one huge kick applied at one small point on the rear tires. Start on low. That's what your gears are for. Take curves and corners at a moderate pace for safety as well as for economy.

On wet or frozen roads skidding is practically unavoidable unless chains are used. The chains must be adjusted loosely enough so that they can travel around the tire, otherwise they will gouge the treads and tear them loose. Take off the chains as soon as the necessity for their use has passed. On a soft road the chains sink into the ground and do not hurt the tires but when you get on a hard road it is another story.

Winter driving is usually wet weather driving, and consequently the treads should be watched even more carefully than in dry weather for the appearance of cuts that may let water get to the fabric. Even the small holes due to punctures ought to be fixed right away. It will be economy to pay the repairman for doing the work if you do not have one of those small, inexpensive vulcanizers that are so easy to use for this purpose without even taking the tire off the wheel or letting the air out.

At all times endeavor to keep out of ruts. It is better for your tires and for the rest of the car, too, to drive on the rough part of the road than to have the sides of the ruts grinding away at the sides of the tires and throwing the car from side to side.

Street car tracks are even worse than ruts. Keep away from them. The tire is distorted and bent as it runs along the rail groove, and on curves and crossings especially there is almost always a knife-like fin sticking up to cut the tread all the way around. This cutting is exceedingly likely to occur in wet weather.

Don't apply the brakes suddenly enough to lock the wheels and drag the tires. Your car will come to a stop sooner if you tighten the brake to the point where the wheels just barely revolve, and your tires will not suffer. Remember that it is the friction of the tires on the road as well as the grip of your brake-bands that stops the car, so don't try to stop all at once. Plan to coast to your stopping point and use the brakes as little as possible. Be sure that your brakes are working equally, or one tire is going to do more than its share of the work and will suffer accordingly.

Application of Tires.

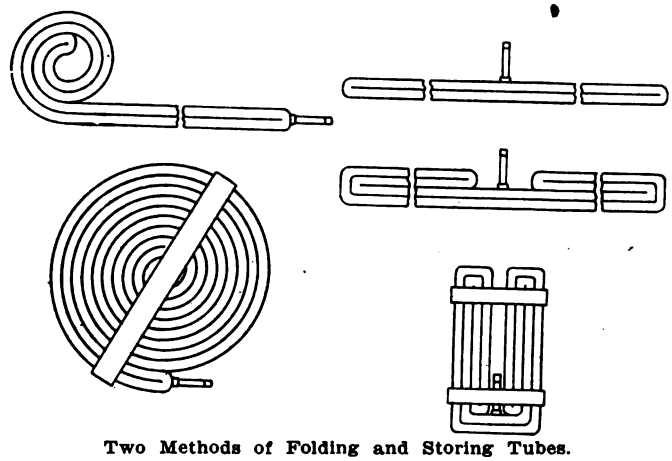
First be sure that the rim is clean. Examine the inside of the casing to see that there are no particles of dirt, or possibly the nail that caused the puncture, remaining to damage the tube. Put into the casing enough soapstone or graphite to cover the inside well and prevent the tube from adhering to it even after long service. Be careful not to use too much soapstone as the excess is likely to collect in one spot, harden and hurt the tube.

Before placing the casing on the rim inflate the tube until it is round and run your hand around inside to be sure that it isn't twisted or wrinkled. If your tire is equipped with a flap be careful to have the flap free from wrinkles or kinks. Never insert a tube in a casing that is damp, and never put in a tube that is still damp from testing for a puncture.

It is generally accepted that the use of an inside liner will prolong the mileage of an old casing. However, they should not be used in new tires as they stiffen the tire, taking from its resilience, and by adding to the thickness of the fabric tend to generate heat.

The experience of the tire manufacturer has taught him how thick a casing should be in order to give the best possible service. The same statement applies to outer casings adapted to be used over a standard tire, and to the practice of sewing or cementing two tires together.

In the manufacture of tires the strength and durability of the tread is carefully balanced with the resistance of



Two Methods of Folding and Storing Tubes.

the fabric to the strains it must withstand. The retreading of an old tire is always of doubtful value as the chances are that the fabric has had its day and will not last long enough for the owner to get the full value out of the new tread.

Retreading is apparently a real economy in the case of a comparatively new tire that has had its tread destroyed by some untimely accident such as tight chains, misaligned wheels, careless braking, etc., providing the fabric has not been exposed to moisture enough to cause deterioration. Cord tires, owing to their construction, which largely eliminates wear of the fabric due to bending, will usually outwear the original tread sufficiently to make retreading very profitable to the owner.

Care of Spare Casings.

Needless to say, the spare tire should be protected from light, water and air by the use of a first-class tire cover.

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If the tire is carried inflated, it should not carry more than half the pressure that it would carry when on the wheel. This may be a little bit inconvenient, but it is better than having a new tire go wrong within a few miles after it is put in use. Many motorists put the new casing on the wheel at once and carry an old one for a spare, believing that this practice reduces the chance of trouble on the road as well as prevents the new tire from having a chance to deteriorate before it is ever used.

If a spare tire is carried otherwise than inflated on the rim, keep water out of it. Examine it after washing the car or driving in the rain, and if it is wet inside wipe it dry.

Care of Spare Tubes.

From three to six extra inner tubes used to be considered as an indispensable part of every car owner's equipment. Punctures were unavoidable and it was practically impossible to make reliable repairs on the road.

Now, however, a great many thousands of people have replaced their stock of tubes with one of the little vulcanizing outfits that carries the rubber patch and a chemical heat unit in one convenient cartridge all ready to put on the tube and vulcanize a permanent repair at any time. It is just as easy and quick to take out a tube, vulcanize it, and replace it as it is to change tubes. Not only is the investment in tubes saved, but a repair bill is eliminated.

The motorist who carries tubes is usually forced to carry them in the toolbox with other articles, which unless protection is given, are likely to ruin a tube before it is ever put into a casing. The jack and the pump and the oil can all do their bit and their job of destruction is made easier by the heat from the engine.

The spare tube should be carefully folded to prevent chafing and carried in a bag that has been well dusted with soapstone. Put it in the coolest corner of the toolbox, away from the exhaust pipe. Pack it in so it can't rattle around.

We illustrate two excellent methods of folding tubes so that they will suffer the least. In both methods it is necessary to take out the valve-inside and let all the air out of the tube while folding, then put the valve back together to keep the air out. Don't tie tubes with a string. Use a wide strip of cloth or some rubber bands half an inch wide, cut from an old piece of tube.

The strength of a tire is in the fabric. The tread is only a covering to keep destructive substances away from the fabric. As soon as a stone cuts through the rubber the weight of the car begins to drive dirt into the cut. The dirt is forced between tread and fabric and usually the first symptom of trouble is a sand blister that may appear several inches from the cut where the dirt entered.

Of course water gets in, too, and as it has no chance to escape it starts a decay in the fabric that almost invariably causes a blowout sooner or later and then both tube and casing are ruined.

Here is an opportunity to take the stitch in time that is so much easier than the nine that must be taken if the first is postponed. At regular intervals, and especially after long trips the casings should be examined carefully for little cuts that penetrate to the fabric. Take your vulcanizer and seal these cuts before the germs of tire trouble begin to infect them. It means the difference between wearing out your tires and having them blow out.

It's like cleaning your teeth to save trips to the dentist, you know. And it isn't much more difficult than cleaning your teeth, either, for it isn't necessary to take the tire off the wheel or let the air out of it.

When on a trip or if it is inconvenient to make permanent repairs for some other reason, use one of the prepared patching gums for a temporary filling until you can get around to use your vulcanizer.

In case a sandpocket appears a good way to arrest the progress of it until you can make a repair is to cut through the tread half way around the blister on the side of the tire so that the dirt can get out as fast as it comes in instead of being crowded in further between rubber and fabric all the time.

Second in importance only to proper inflation is the care of small tread cuts and sand blisters. With an open cut in the tire, a few hundred miles is enough to cause a destructive blowout—and blowouts are expensive. It has been said that the last mile in a tire is the cheapest and unless one takes prompt care of the little cuts he can be mighty sure that he will never get *any* cheap miles.

The information we have given is based largely on the advice of tire manufacturers who have given it willingly in order that users of their product may secure all of the mileage that is built into their tires—and after all mileage is what we really buy when we buy a tire.

*Note.—Mr. W. E. Faber is the Advertising Manager of the C. A. Shaler Company.

(*To be continued.*)

CLEANING CELLULOID WINDOWS.

We have in this office a number of letters from subscribers who wish to know how scratches and marks can be removed from celluloid windows in automobile curtains and will answer them all in one article.

Celluloid is a soft material and after constant use its surface is covered with hair scratches which tend to render the material translucent or cloudy. There is no practical method for removing these scratches, nor is there any need for so doing.

The reason for the whiteness of the celluloid is that each scratch refracts the light which passes through the material at an angle and so clearness can be had by filling the scratches.

A rule which often works on many grades of celluloid is as follows: With a fine brush apply a thin coat of ether to the surface and let it dry in the air. Only fine hair scratches will yield to this treatment, but the resulting surface is practically as good as new.

If the scratches are heavy they can be filled in many cases by the application of a thin coat of white shellac or varnish.

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Differentials and Universal Joints

The Engine May Be Important, But It Is Useless Unless the Transmission System Is in Order.

BY F. L. ALLEN

PRACTICALLY every one who has never thought the matter over, has an idea that the most important part of an automobile is the engine, and to a certain extent this is true, but there are many things between the engine and the rear axle. As far as we have

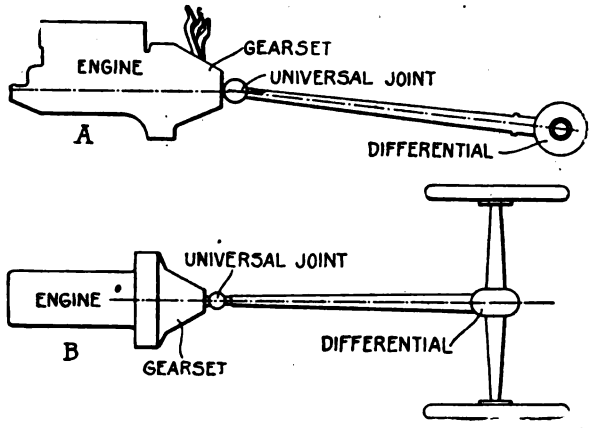


Fig. 1—Sketch Showing Change in Direction of Power Transmission from Engine to Wheels.

gone, power has been transmitted from the engine through the clutch and the gear-set, and if this unit is attached to the engine or located amidships, as far as we are concerned, the power has been transmitted in a straight line.

The power plant, consisting of the engine, the clutch and the gear-set, is usually located high upon the frame of the car, and is never in line with the center of the rear axle. Therefore, we must adopt some means whereby we can alter the direction of the power from a line parallel with the ground as shown in figure 1 at A, to the center of the rear axle.

The connecting shaft or the connecting link between the transmission gear-set and the rear axle is usually termed the propeller shaft, and as there is a sharp bend in the power line at the rear of the gear-set at that point, some sort of a double hinge must be provided. This device is termed, in automobile vernacular, as a universal joint. It is really as we have described it—a double hinge. There are many forms of universal joints.

In figure 2 are shown two types of universal joints. The second, at B, is known as the cross and ring type, and is very simple in construction. It consists of two Y-shaped members—one of which fastens directly to the gear-set shaft—the other to the propeller shaft. These are placed with the tops of the Y's together, and the points of the Y's 90 degrees apart. The points of the Y's are held in place by a ring usually made in halves, either riveted or bolted together.

The type of joint shown at A is even more simple than that shown at B. In this case the ring is left out, and the Y-shaped members fit directly upon the cross, which is termed the spider. As a general rule, joints of this type are fitted with bronze bushings, so that in case of wear they may be repaired very easily without taking the joint from the car.

In figures 3 and 4 are shown two more types of universals. The one shown in figure 3 is nothing more or less than a slide in which a T-shaped member is fitted. The casting, which is circular in form, is bolted to the driving shaft of the gear-set and entirely surrounds the joint. Across the diameter of this casting are cut two grooves, and into these grooves is fitted a T-shaped forging which connects directly to the propeller shaft. Both studs at the top of the T are fitted with small round balls so that this joint may be repaired rather than be removed in case of wear.

A joint illustrated in figure 4 is very popular among the car manufacturers. It is a combination of a number of types, and is simple in construction but very efficient. There are three parts to it—the circular member is bolted to the transmission shaft, the cross fits into it at two points and leaves the other two points upon which are mounted the Y-shaped member which attaches to the propeller shaft. These universal joints may be found at any point where there is a change in the direction of power transmission.

One or More Universals.

In many cases where gear-sets are located amidships, that is, separate from the engine, one or more universal joints may be interposed between the engine and the gear-

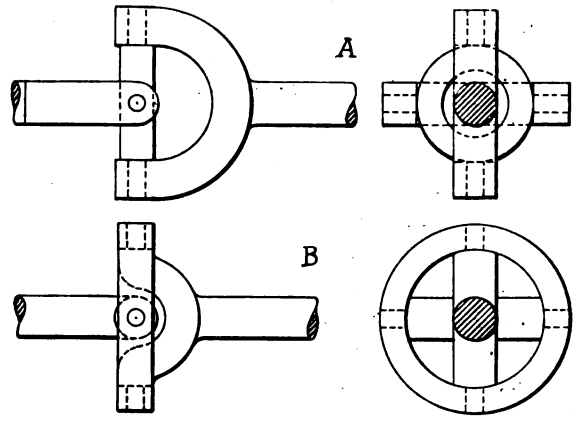


Fig. 2—Two Types of Universal Joints.

set. Between the gear-set and the rear axle may be found one or two universal joints. If there are two, one is placed at the rear of the gear-set, while the other is placed at the opposite end of the propeller shaft where it is connected to the pinion gear in the differential.

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One should realize that the universal joint carries all of the power from the engine: It is a moving member, and each hinge moves back and forth at every revolution of the shaft. Consequently, it requires a great deal of lubrication. It cannot be left open because it will soon collect dust and grit and be destroyed.

There are two general methods of protecting the joint from dirt. The first is to enclose it with a boot of leather, while the second is to build round it a thin sheet-iron housing. This boot or case must be kept oil-tight, or the lubricant will leak from it. Therefore, in replacing the universal joint always be sure that the housing is tightly fitted in its place. Wherever there is a change in the line of power transmission, there is bound to be a certain amount of whip, as it is termed, unless the joints and bearings are absolutely tight. For this reason a worn universal joint or a joint that is not tightly fitted to the shaft will cause considerable racking of the car and engine.

Not only is there a change of direction in the power line downward, but in order to transfer the power to the wheels in the ordinary automobile there is a change

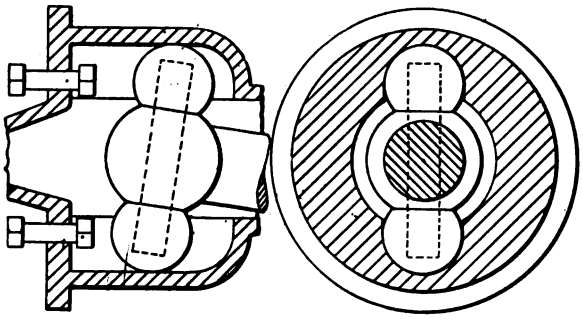


Fig. 3—Sliding Ball Type of Universal.

in the differential of the power at right angle, as shown in figure 1 at B. This change at right angles means that the rear axle is always subjected to a twisting motion in two directions.

First there is a tendency to twist the car over to one side, that is, to lift one wheel from the ground. The springs of the car take care of this tendency. The other tendency, however, is to twist the rear axle upward at the front and downward at the rear—just the reverse of the power required to twist the wheels and carry the car forward. For this reason some means must be adopted for anchoring the rear axle housing so that it will not strain the springs in a direction in which they cannot take up the shock properly. For this purpose rods called "torque rods" are used. Another term applied to these same rods is "radius rods." These rods are firmly fastened to the rear axle housing, and anchored as far forward on the car as practical. Since the change of power direction is at the universal joint directly behind the gear-set, the radius, or torque rods are fastened to the ball housing around the universal joint.

Not all cars, however, are fitted with such rods. In many cases, the propeller shaft is enclosed by a housing which swings upon the rear of the gear-set with the center of the universal joint as its center. This housing is designed heavy enough so as to take up this torque.

Reason for the Differential.

One seldom realizes how many problems are involved in constructing a rear axle and transmitting the power from the engine to the wheels. Aside from the problems which we have just mentioned, there is one more little natural law that means a great deal to the automobile manufacturer and costs a lot of money to overcome. This problem would be obviated if an automobile were always driven in a straight line. Unfortunately, however, all of our roads are not straight. Occasionally the automobilist finds it necessary to turn his car around, or to turn a corner. This means that the outside wheel on the corner must travel a greater distance than the one on the inside.

In turning entirely around, the outside wheel (assuming that both are 30 inches in diameter), must turn about two turns more than the inside wheel. Suppose that both of the wheels were fastened together, and forced to turn at the same number of revolutions. Then one of the wheels would be dragged and, sooner or later, the tires would be destroyed.

In addition to transferring the power to the wheels then, we must find some means of arranging the axle so that one wheel can run faster than the other if necessary. At the same time, however, we must so arrange the wheels that when the car is being driven straight ahead one wheel will not do all of the driving.

This is accomplished by means of what is termed a "differential;" a simple little device when one understands it, but a difficult thing to understand. In Figure 5 is illustrated the ordinary type of differential. At A is shown the driving pinion which is fastened directly to the propeller shaft from the gear-set. This pinion A meshes with the large driven gear, usually termed the "master gear," B. Now, B is not fastened directly to either of the axles which drive the wheels, but to the device termed the "differential." It is riveted or bolted to the differential housing E, therefore E rotates as long as the gears are in mesh and the pinion A is being driven.

Differential Gears.

Inside this differential housing are a number of gears, three, or in some cases four, one of which is shown at C, which are mounted upon the differential spider. This differential spider is firmly fastened to the differential housing, and of course rotates with the master gear B. These "differential pinions," as they are termed, shown at C, mesh with the differential gears D and there are two of these differential gears D, each of which is keyed to one of the driving axles attached to the wheels.

Suppose you were to lift one of the rear wheels from the ground. Let us assume that you lift the right wheel free, start the engine, and mesh the high speed gears in the gear-set. The pinion A starts to revolve imme-

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diately, driving the master gear B which in turn carries around with it the differential housing E together with the differential spider. The differential gear at the left, which corresponds to D, being mounted upon the axle of the wheel which is held stationary, does not revolve, but since the housing E revolves, the pinion gear C rolls around upon the differential gear and this motion is transmitted to the gear D, therefore the free wheel revolves. The same thing would happen if you were to jack up the left wheel, except that, in this case, the differential gear D would remain stationary, and the differential pinion C would drive the left differential gear, and the left wheel would revolve.

Power Goes to Least Resistance.

In other words, power is transmitted to the wheel which is doing the least work. Now if both wheels are on the ground, the differential pinion C transmits the power equally to both differential gears, and the car moves forward in a straight line.

As another experiment, let us see what happens if we remove both rear wheels from the ground, and hold the pinion A stationary. We can do this by throwing in the high speed and engaging the clutch. The engine will then offer enough load so as to prevent the gear A from revolving. Then supposing we turn one of the wheels, the right one for instance, clock-wise. The differential gear D will revolve and necessarily turn the differential pinion C. This gear will drive the other differential gear which corresponds to D on the other axle, and the left wheel will revolve in the opposite direction.

The differential gears C and D only revolve while the car is turning a corner. On a straight road they are practically stationary. The whole housing E, however, revolves as long as the car is moving, therefore some means must be provided for carrying this housing and preventing friction. This is done by means of bearings

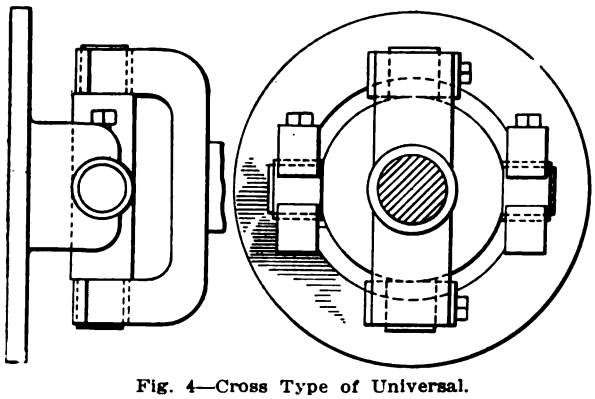


Fig. 4—Cross Type of Universal.

as shown at F. Another bearing is provided for the pinion drive gear at G.

Gears Must Be Properly Adjusted.

Every reader knows that two gears cannot run quietly unless they are properly meshed, and of course this same statement holds true regarding the driving pinion A and the master gear B. In practically all of the medium and high priced cars two sets of adjustments are provided. The first adjustment allows one to move the pinion A forward and backward, and so mesh it lightly or deeply with the master gear B.

The second series of adjustments are arranged so that B, the master gear, together with the whole differential unit, may be moved to the left or to the right, nearer,

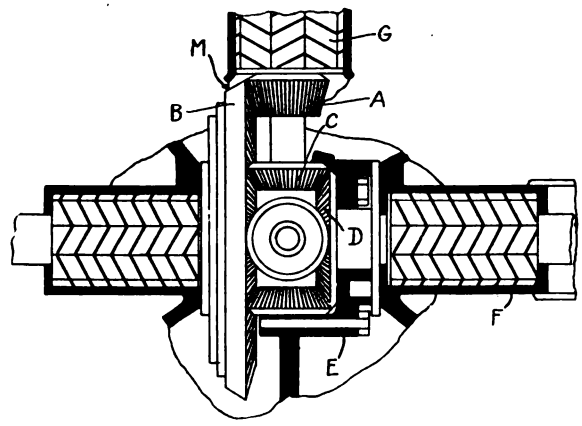


Fig. 5—Sketch Showing Differential Parts.

or farther away from A. The first is called the pinion gear adjustment, while the second is termed the differential adjustment. In making this adjustment, the pinion gear A must be moved towards the differential and the differential together with the master gear B moved towards the pinion until the teeth are tightly together, or "bottom," and the backs are in line as shown at M.

Line Up the Backs.

By rubbing the finger across this line, one can tell whether the backs of the teeth are correctly adjusted. If this adjustment were left in this position, the gears would grind, because they are meshed too deeply; therefore it is necessary that the pinion gear A be moved backward, but the relation of the two gears must be the same. If A is moved backward one sixty-fourth of an inch, B must be moved away from A a like distance. Therefore this is the next step in the adjustment.

Move A backward about one sixty-fourth of an inch, and B a like distance. Then fit a wooden handle to the pinion gear shaft, and turn A by hand. If the gears are still too tightly together, there will be a grinding noise and each of the gears must be moved backward a very slight amount until the grinding noise ceases.

If there is any backlash, or play in the gears, it is an indication that they are too far apart, and must be brought nearer together. If the teeth are so badly worn that backlash is had in any position, they must be replaced with new.

Under no conditions should the gears be left in the first position adjusted, that is, with the tops of the teeth of one against the bottom of the teeth of the other. This condition will result in the destruction of all of the bearings in the differential as well as the gears.

In cheaper cars, particularly in the Ford, no means is provided for the adjustment of these gears, and the only

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way that the repairman can fix them properly, is to insert washers between the pinion A and the bearing, and between the differential housing and the bearings at each side until adjustment is correct.

There are two main types of axles in use upon automobiles, and they are grouped into two classes: "live" and "dead." Every reader is familiar with the dead type of axle, because it is just this type of axle that is used on every wagon or carriage built. The dead axle is fastened to the car and carries all of the weight. It does not revolve or drive the wheels. When used upon an automobile, the wheels are driven either by chains or by a set of gears. The axle itself does not revolve.

The live type of axle is divided into two main classes, floating and semi-floating, and different manufacturers make still further divisions. In the main, however, there are really only three classes of live axles, into one of which practically all live axles fall, and these types are illustrated in Figure 6. They are known as "semi-floating" as at A; "three-quarter floating," as at B; and "full floating," as at C; and one will notice that B differs very slightly from C.

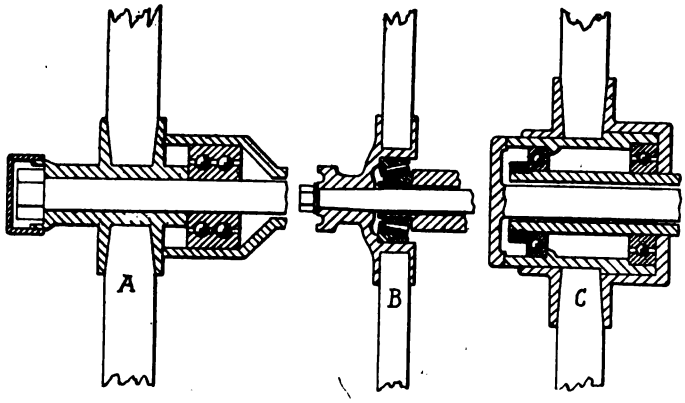


Fig. 6—Three Types of Axles. A, Semi-Floating; B, Three-Quarter Floating; C, Full Floating.

As a matter of fact, B and C may be considered in the same classification.

The Semi-Floating Axle.

In a semi-floating axle, the weight of the car, which rests upon the wheel, is entirely supported by the axle and its bearings, which are located inside of the rear axle housing. At A in Figure 6 is illustrated this type. The wheel is keyed to the axle, and the axle in this case rotates upon a set of double ball bearings. The outer race of this ball bearing assembly fits inside the housing, and of course supports the gear.

Conditions are reversed in the diagram C, showing the full-floating type. The rear axle housing extends inside the wheel and upon its circumference are mounted the bearings. Two ball bearings shown in the illustration serve to support the wheel. All of the weight of the car therefore is carried upon the housing itself.

The axle is used simply to drive the wheel and supports none of the weight. As a matter of fact, the weight of the axle itself is carried upon the wheels, since it is held by a driving flange to the wheel. In this full-floating type, one will notice that the wheel is supported upon both sides, two bearings being used.

(Editor's Note.)—The reader who is called upon to do any Ford or Chevrolet differential repair work should investigate the Bailey ball thrust bearings.



TRUTH IS OFTEN STRANGER THAN FICTION

A short time ago our editor, in looking through one of the New York papers, noticed an Associated Press report which read like a fable. The article was so unique that the editor sat down to his battered typewriter and pounded out the following poem.

One Hundred Per Cent American.

There once did live a Patriot true,
Whose name was J. C. Wagner.
He didn't shoot the kaiser up,
Nor hunt him with a dagger.
But he did have one son, did John,
A sturdy six foot Danny,
Who donned the khaki uniform,
And fought for Uncle Sammy.

* * *

Besides his son, old Johnnie had
A clock that said "Cuckoo."
And on its back, in letters bold,
"From germany to you."

* * *

When J. C.'s son had marched away,
That clock no more was heard;
The Cuckoo you will recollect,
Is hunland's national bird.

* * *

For thirty days and thirty nights,
Old John scarce shut his eyes;
His idea was, perhaps you know,
That clock to naturalize.

* * *

With saws and drills and bits of wire,
J. C. began to work,
He rigged a funny bellows up,
From last year's hard boiled shirt.
At last he rested from his toil,
His work is finished right;
The clock is running once again,
The bird now says "Bob White."

After having inserted the necessary (as well as unnecessary) periods, commas, stars and caps, he forwarded it to the subject, Mr. J. C. Wagner of Indiana, and shortly was rewarded with the following letter:

"Dear Sir:—

Your letter with poem enclosed has just been received. Yes, I am the J. C. Wagner that naturalized the cuckoo

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clock to call Bob White. I reversed the bellows connection so that the high soprano whistle came after the alto. After reversing the whistle, a teaspoonful of sand poured into the soprano pipe or whistle raised the tone to the correct pitch.

If one teaspoonful is not enough to accomplish results, it is only necessary to give him or her more sand, until the right pitch is attained. It seems that a liberal dose of American sand is necessary to put the kibosh on kultur in a cuckoo clock; just as Yankee grit blocked german kultur at Chateau-Thierry. A battle in which my son took part, by the way.

In a later action, on October 10th, my son was wounded in action near Verdun; a piece of high explosive shell struck him above the ankle and fractured the shin bone. He is still in the hospital but we expect him home soon."

Though the subject does not pertain to automobiles we trust that our readers will be enough interested to pardon the digression, since the whole story and its sequel are so unique.

Winter and Wet Weather Driving

BY J. FRED GILMAN

Starting your engine on a cold morning.

The cooling system requires more care in winter than in the summer.

Saving gas by using the hand throttle.

A few words about chains and their application.

Other money-saving kinks.

WHEN you start your car these cold mornings, have you noticed that the self-starter whirs a longer time than it did in summer before the engine starts? The self-starter is designed to start the engine, and will, if the battery is in proper condition. But bear in mind that the current consumption is not by any means proportional to the time that the self-starter consumes to start the engine.

The greater viscosity of cold oil in winter will make the starting torque so great as to demand three or four times the amount of current from the battery than it did in summer. Therefore, assist the starting motor by providing a rich gas mixture. Prime the carburetor in the usual way and choke the air inlet. All of the rich mixture will not reach the cylinders as much of it will condense on the cold walls of the intake manifold. In doing this you remove a goodly portion of the burden that would otherwise be demanded from the battery.

Take time in warming up the engine in cold weather. Remember that nothing is gained by trying to hurry it. If the car has been standing twenty-four hours the oil has drained back from the cylinder walls and bearing surfaces, and the crankcase oil, if cold, is sluggish and viscous, and will take a little time to get back to its normal operating condition and this only when the engine is thoroughly warm.

Don't jump upon the accelerator and let the engine race like a Lewis gun, for with poor lubrication this method usually results in serious damage and is bound to have a bad effect if practiced regularly. Run the engine slowly for three minutes before putting it to work and you economize not only in repair bills but also in oil and gasoline.

WATCH your radiator for leaks especially at this time of year. It will naturally be filled with anti-freezing liquid in winter and while a small leak in the system in summer would not be important, the present high price of non-freeze fluids should encourage the car owner to make a careful inspection every so often.

When the foot throttle or accelerator came into general use the hand throttle on the steering column has appeared nonessential to many drivers, while in a few cases manufacturers have ceased to fit it upon the car at all.

The use of the hand throttle under certain conditions will prove to be an economical fact that will astonish many. On a long straight drive or slightly curved roads, in parks, on boulevards, it is advisable to use the hand throttle instead of the accelerator because of the fact that it maintains the throttle butterfly valve in a steady condition instead of the usual fluttering, vibrating position, as is almost continually the case when the accelerator is used.

On rough roads this is especially noticeable, for the vibration of the floor boards causes the foot to keep the accelerator pedal in slight but constant vibration. Therefore the carburetor cannot do its best work under these conditions and a constant flow of gas when the hand throttle is set will give more even running and will relieve the rest of the chassis and tires from the strain of constant acceleration, of "picking up" and "slowing down."

Now is the time to buy your hood and radiator cover. You promise yourself to get these some time, but many put it off from day to day and then it is never done. The result will be that a robe will be used as a makeshift, or possibly nothing at all is provided to protect

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the inside of your engine when it is standing. This results in a waste of fuel. A cold engine means imperfect vaporation and congealed oil. The former necessitates opening the throttle wider because the mixture is not so efficient and the latter, friction in the engine which calls for still further opening of the throttle.

So if operating the car with a cold engine is bad what usually happens is that the engine is left running, thus insuring its good working condition. This is a waste of gasoline and oil and any owner who will take the trouble to find out will be surprised at the amount of fuel that will be consumed in a day in this way.

And watch your windshield, for glass is easily broken on a morning when the mercury is trying to creep down to the thermometer bulb. The cold makes the glass more brittle and often a sharp jerk on the windshield to change its position will crack the glass.

When you come in from a long drive and the car top is covered with snow, brush the top by folding it back, and then allow it to dry with the top up. A folded top, if damp, will deteriorate rapidly and will soon discolor and crack. Don't clean a top with gasoline for gasoline will ruin any rubber which is in the fabric or construction. When the top does need cleaning use good castile soap and a scrubbing brush. Soap and water will have an equally good effect on the celluloid windows, too.

THE driver who fails to equip his car with some form of anti-skid chain for the coming months is neglecting a sane precaution, but these should only be used when absolutely necessary. They should be fitted loose enough so that they will work around the tire and accordingly distribute the strain, but they should not be so loose as to form a "bundle" and bring about the pounding and bumping which is very detrimental to the tread. Your tire man will tell you that chains are a form of insurance against accident. You will pay for them in the shortened life of your tires. The wear due to chains is very slight and the insurance is well worth while. Chains applied too tight will considerably shorten the life of the tires. They will not prevent skidding if applied in this manner, and will bite into the tread and play the part of a skate.

This is especially true on wet or icy pavements and the bite in the tread can easily be recognized and the cause determined on account of the chain-link impression on the tread, which is usually in evidence. Chains should never be applied when the carcass of the tire is exposed. Disregard of this point not only proves costly but the blow-out takes place at a most inconvenient time, because chains are usually used on rainy days, on muddy roads, or during the winter after a heavy snowfall.

Don't trust to your chains to prevent skidding on pavements. A skid usually results from the lack of a secure grip of the tires on the pavement. It sometimes happens on a dry roadway but usually this is due to excessive speed. Some drivers find that their cars skid nearly every time they put on the brakes, especially on a wet pavement.

This is probably due to the brakes not being adjusted to the same tension so that one brake takes hold sooner than the other. This condition will naturally wear off one tread sooner than the other and cause the car to swing around because of the one-sided resistance.

If the brakes take hold equally and the same thing happens it may be that the driver applies the brakes too suddenly, or the brakes may grab or lock. In either case the result is the same, the wheels lock and slide along on one place in the tire and the resistance to forward motion is the same as that of side motion so that it is just as easy for the car to slide sideways as forward.

The brake may grip too suddenly because of the fact that rivets are sticking up and jamming between the drum and the shoe, or perhaps the drum may have become scarred or bent.

Most owners have the idea that there is little difference in gasoline economy at different speeds. Every car has its own speed, or to state more clearly, a certain speed at which it will operate more efficiently. This is generally between fifteen and twenty-five miles an hour and the driver can usually tell from the sound of his engine and the feel of the car under him just where this speed lies, as he comes to understand it thoroughly. The slower the car is driven the better the economy and this holds good for tires and general wear and tear of the car's mechanism.

One of the most common causes of lost gasoline is that of flooding the carburetor, which is usually occasioned by foreign elements, such as dirt and dust, preventing the needle valve, that controls the flow of gasoline to the float chamber from seating. This valve shuts off the supply when the float attains its proper level, but if the needle will not seat, the gasoline continues to flow and, of course, is wasted.

Strain the Gasoline.

This defect can be remedied by carefully straining all gasoline used, by opening the drain cock of the gasoline filter and by occasionally draining the float chamber of the carburetor. If the flooding still continues, the float should be examined for it probably leaks. The careful motorist shuts off his gasoline supply each night.

Remember that an economical use of momentum means economy in gasoline and in obeying this rule for a month you will notice the difference in the gasoline bill. When you are about to make a stop, close the throttle and push out the clutch and "coast," applying the brake gently when your destination is reached. If you constantly practice this little saving you will subtract a lot from the running expense.

A very frequent cause of spark plug trouble is oil or particles of carbon collecting between the points and sooting of the porcelain. Remove the oil or carbon. If the carbon on the porcelain is hard, do not try and scrape it off. The plug may be soaked in kerosene until the carbon is soft enough to wipe off with a cloth.

Points out of adjustment or burned away will cause missing and the plug points should be set to approxi-

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mately 1/32 of an inch for the best fuel consumption and economy. The distance, of course, will vary slightly with different engines but this is a good rule to follow.

The breaker points on the magneto should be smooth and in proper adjustment to get the most out of the mixture. When the points wear and the gap becomes too large the spark will not be as strong, the explosion not so powerful. In this case more gasoline would be required.

Ignition Troubles.

Trouble with the ignition system is one of the greatest causes of annoyance for the simple reason that ignition is practically a mystery to most automobile owners. The system is either let alone or neglected when it should be taken care of or the owner goes to the other extreme and injures it in a way to cause trouble.

When trouble occurs in the ignition, do not lift the hood and shake a few wires. Take the time to get under the car and trace each wire to its source or to the mechanism to which it carries the current, and satisfy yourself as to just what condition that particular wire is in.

Looseness where the wire joins the terminal will make all the difference in the world between satisfactory operation and trouble. Many times a self-starter has failed to operate for no other reason than this. Keep the platinum points clean and blow out the carbon dust from the wornout brushes before there is a chance of current leaks or of a short circuit.

When turning on the headlights, switch on the dimmer first. This causes a gradual heating of the filament as opposed to the sudden hot flash of the brighter lights, which in many cases, burns out the filament.

The various incidents related prove that one is unwise who takes things for granted. It is also important to bear in mind that it is not wise to use too much logic in trouble hunting, for often the solution is far from logical. It is wise to reason out as carefully as possible the situation that is at fault and then go about it in the most practical manner.



Oxy-Acetylene Welding Methods

There Is No Subject of More Vital Importance To the Repair Man or Mechanic Than This.

BY J. F. SPRINGER

OXY-ACETYLENE welding is a subject that touches pretty much every important line of activity having to do with metals. The building and repair of locomotives and other railroad rolling stock constitute one large field of operations. The construction and repair of passenger automobiles, motor trucks and tractors provide another. The manufacture of non-ferrous utensils and applications to brass, copper and aluminum work provide still another. The oxy-acetylene torch is, in fact, the great instrument of construction and repair pretty much everywhere that the leading industrial metals are used.

It is a remarkable instrument in repair, since it is able not only to unite metals but to replace lost parts. Its portability lends itself particularly to repairs. When the plumber, with its aid, is able to go into residences and public buildings and repair on the spot, breaks in cast-iron and other metals that have hitherto been difficult, then we have proof of a superlative repair process. The oxy-acetylene process is just the procedure to reach such cases.

The amateur machine shop, the big machine shop, the railroad round house, the plumber's shop, the foundry, the factory turning out miscellaneous non-ferrous work —all these, and others, have use for the oxy-acetylene torch, for the simple reason that they are often up against problems which the oxy-acetylene torch can and does solve.

A very important line of activity in which oxy-acetylene welding has been found to be of tremendous value is in the welding of sheet metal. Such work as welding the seams in the nickel-plated containers of the Edison storage battery is just the kind of work in which the oxy-acetylene process is very valuable.

Both in new and repair work, the process is a wonderful adjunct. But it must be intelligently used. It is the purpose of the present series of articles to set forth the fundamental methods of handling work. Those interested are urged to read attentively and to skip nothing whether it seems useful or not.

Oxy-acetylene welding is carried out, ordinarily, by means of a torch or blow-pipe held in the hand. There are two gases passing through the instrument and issuing from the burner. These are oxygen and acetylene. A double flame is formed. The inner white flame is quite small and may be only 1/4 or 3/8 of an inch long. The outer flame is quite large and forms a kind of envelope.

It is with the tip of the little white flame that the work is chiefly done. Here we have a temperature of something like 5000 or 5500 degrees F., or perhaps more. It is largely because of the enormous temperature that work covering such a wide range may be done.

In fact, all the usual industrial metals yield to this temperature. There is no trouble encountered in melting gold, silver, iron, cast iron, steel, copper, brass, bronze,

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aluminum, tin, lead, etc. Consequently, the oxy-acetylene torch has a very wide variety of uses.

Cast Iron Welding.

Cast iron was one of the first materials dealt with commercially. Almost any break in cast iron may be repaired. For example, if an engine water jacket has cracked for any cause—as from the freezing of contained water—the oxy-acetylene process is just the thing for repairs. Furthermore, unless the break is at some inaccessible point, the torch, together with the oxygen and acetylene supplies, may be brought to the spot and the radiator repaired not only without removal but without dismantling the engine in many instances.

Again, a break may occur in a steel channel frame section of an automobile. The repairs may be made by the oxy-acetylene process without disassembling the machine. In fact, in a case like this, the process comes in in a double manner. That is to say, by means of a suitable

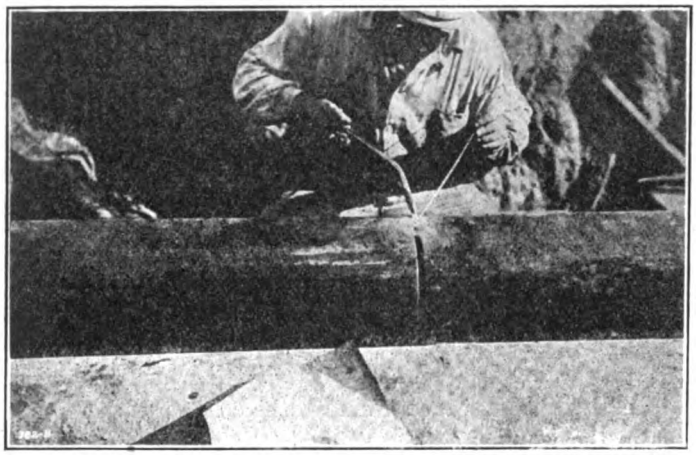


Fig. 1—Joining Two 20-Foot Sections of Extra Heavy Pipe, ⅜ Inch Thick and Ten Inches in Diameter, by Means of Prest-O-Lite Oxy-Acetylene Process.

compound torch or a suitable attachment to the welding torch, the process may be utilized to cut out damaged members as well as to weld up seams or rivets. A high pressure jet of pure oxygen associated with the ordinary oxy-acetylene welding flame enables the operator to cut steel both thick and thin, both cast and rolled. Steel may be cut but not other metals.

But to go back to the simple welding operation. It may often be used to build up a part that has been broken off and lost. It may be a bronze or a brass knob or part of the control wheel or other device, attached to a valve. In such cases, if conditions are favorable, the oxy-acetylene process may be brought in not merely to secure the two pieces together but to build up the whole of that which is lost and gone.

The powerful little white flame melts off bronze or brass from a rod of the material and enables the operator to build up and fashion the lost part—to add it onto the main portion. This may at times be done without removing anything. The finishing of the new piece is a job for the file and similar tools.

Let us suppose, for example, that a casting has been broken across. It doesn't matter whether it is cast iron, brass, aluminum, steel—the oxy-acetylene process is well adapted to mend the break and unite the two parts. It doesn't matter whether the casting is a small one, such as a radiator unit or a part belonging to the steam plant in the basement of an apartment house. Or it may be a frame or a bracket belonging to railway equipment. It may be a big casting, such as the base of a big machine. Big or little, it is all the same to the oxy-acetylene process.

The casting may be new and still in the shop; it may be old and at the bottom of a pit. New or old, under shelter or out of doors, near the shop or far from it—it is all the same. Torches may be taken to the work and also tanks containing the gases oxygen and acetylene. Or, the work may be brought to the shop. Some shops have the acetylene piped to various points of convenience and secure it by flexible or other branch piping.

Grafting on Unlike Metals.

The job in hand may require that a malleable iron piece be secured to a rolled steel part; or it may be that a piece of hard brass needs to be united to a soft brass part—it is a job for the oxy-acetylene process. Whether the operator can do it or not will depened largely on how much he knows about the process.

There are, naturally, some jobs that cannot be handled by any process. The break, for example, may be located where neither the oxy-acetylene torch nor any other instrument doing similar work can be inserted. In short, the job may be out of reach. Then there are jobs which can be done, but require more than ordinary skill and knowledge. Just an ordinary welding man could hardly be expected to weld up a break in a high-pressure copper steam pipe on an ocean liner. It takes skill and knowledge. But there is such an enormous amount of new and repair work that the ordinary oxy-acetylene welder really can do and do acceptably that we need not be worried if some jobs are beyond him.

The great power of the oxy-acetylene flame is the thing that enables it to conquer pretty much any metal. But this power is, at the same time, the thing that will make trouble for the careless workman. The very ease with which metal may be melted makes it necessary to be on the watch lest the flame be allowed to do too much. Thin metal, the melting temperature of which is rather low, must be handled wisely, otherwise damage to the metal will be done.

So it will be well for the beginner to face the fact that oxy-acetylene welding is an art to be studied seriously and not just picked up by watching some one at work. What the welder needs to know is the construction and mode of operation of his torch; the methods that have been found adapted to various classes of work; and the reasons for the various rules and directions.

Just now, let us pay some attention to the flames which issue, as it were, from the torch. The little white flame constitutes the welding tool. Ordinarily, the tip of this flame is what is used. The tip marks the hot spot. The

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character of the flame closer up to the burner and farther away is different from what it is in the region of the tip end.

Nearer the burner there are understood to be three gases flowing along—oxygen, gaseous carbon and hydrogen. The oxygen will generally be undesirable for contact with hot metal. The carbon will also be undesirable, but perhaps for a less number of jobs. The hydrogen will often do no harm. If the reader has grasped the point here, he will readily understand that he should be on his guard lest this part of the flame flow against the work.

Further out from the burner, at points beyond the end of the tip of the white flame, the conditions are more favorable. In fact, all this region, including the big enveloping flame, acts as a protection to hot metal. It is eager for oxygen and readily licks it up, whether the oxygen be stray oxygen that has come through the torch and has failed to unite with either the carbon or the hydrogen, or whether the oxygen comes from the surrounding atmosphere.

The Construction of the Torch.

It is important that the user as well as the prospective purchaser of an oxy-acetylene outfit understand something of the construction features of leading commercial torches. It will, ordinarily, be best for a purchaser to secure a torch that is backed by substantial reputation and responsibility. Otherwise, he may find himself in possession of an instrument which will consume an *inordinate amount of oxygen.*

As oxygen is an expensive gas, this condition of affairs would mean continual loss through waste. A high class torch will consume around 25 per cent more oxygen than acetylene. There is probably nothing gained when this figure is exceeded, but something is lost through wastage. A torch which will operate day in and day out at a lower figure is an excellent torch from the point of view of economical consumption of oxygen.

As regards performance, a torch may be tested in the following manner: Let standard work be carried on—that is, work requiring a neutral adjustment of the flame, which neutral condition corresponds to a sharply outlined single inner flame of brilliant white. Such work is, in general, that which consists of rolled or cast steel, iron or nickel. The consumption of both gases is to be noted by means of the indicators. The longer the period, or the sum of the divisions of the period, the better the final result. The relative amounts of oxygen and acetylene will show whether the torch is operated to high advantage.

Oxygen will ordinarily be brought and not made on the spot. It will come in steel containers and will be under high pressure. The high pressure is needed to reduce transportation costs. Acetylene may be made or not. This gas, as it enters the torch, may be under a very low pressure or else under a medium pressure. The construction of the torches differ in accordance with the use of gas under medium or low pressure; so that it is necessary to make selection to correspond.

The business of the torch is to receive the two gases, to mix them, and without danger of a flare-back to discharge the mixture from a tip or burner under considerable pressure.

It is necessary that the mixture issue from the burner at a fairly rapid rate. Otherwise, the speed of flame transmission may be greater than the rate of forward movement of the mixture. In this case, the flame would enter the burner. This requirement that the mixture shall issue under considerable pressure means, even in the case of the use of low-pressure acetylene, that the *oxygen* shall be under considerable pressure.

Preventing Flare-Back.

The prevention of a flare-back is, in part, taken care of by pressure. But this is hardly precaution enough. A favorite method of preventing a flare-back from retreating back of the torch itself, and possibly reaching the acetylene reservoir or tank is to use a porous material as a packing in a suitable location inside the torch—or rather, torch handle—and compel the gas or gases to pass through it. Where acetylene is generated in a fixed generator at a shop, a high class generator will probably be so arranged that a flare-back would have to pass through water to get to the storage compartment or tank.



Fig. 2—Welding Gas Pipe "On the Road"; Insert at Right Shows a Cutting Operation. The Big Advantage of Oxy-Acetylene Welding Is That Work Can Be Done Practically Anywhere.

The mixing is one of the most important functions of the torch. Upon the thoroughness of the mixture depends the economy of oxygen consumption. Let me explain. The oxy-acetylene process depends upon limiting the combustion of the carbon, derived from the explosion of the acetylene, to carbon monoxide. In order to get this result, and thus avoid combustion to carbon dioxide, the supply of oxygen is limited. The proper amount re-

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quired is exactly the same as the volume of acetylene. Any oxygen over and above is really not wanted. This is understood to be the state of affairs.

The reader may now ask: Why then is a greater amount of oxygen supplied than of acetylene? The reason appears to be just this. An excess of oxygen is necessary in order to make sure that every bit or particle of acetylene will have *alongside* or *near* it a corresponding bit or particle of oxygen. If the mixing could be done to perfection, then precisely the same volumes of oxygen and acetylene should be supplied the torch. *The excess of oxygen required by a torch is to be viewed as the measure of its imperfection in securing a complete intermingling of the two gases.* There is probably no commercial torch in existence capable of perfect mixing. The thing to do, then—other things being equal—is to select and use the one requiring the smallest excess of oxygen.

(To be continued.)

SHOW DATES THAT HAVE BEEN FIXED.

February 22-March 1
Atlantic City, N. J. Automobile Trades Assn.

February 22-March 1
Hartford, Ct. Automobile Dealers' Assn.

February 23-March 1
Cedar Rapids, Ia. Automobile Dealers' Assn.

February 24-27
South Bethlehem, Pa. Lehigh Valley Auto Shows Co.

February 24-28
St. Louis, Mo. Auto Manufacturers' and Dealers' Assn.

February 24-28
Duluth, Minn. Automobile Trades Assn.

February 24-March 1
Nashville, Tenn. Automobile Dealers' Assn.

February 24-March 1
Kansas City, Mo. Kansas City Tractor Club.

February 24-March 1
Springfield, Ohio. Automobile Dealers' Assn.

February 24-March 1
Portland, Ore. Dealers' Motor Car Assn.

February 24-March 1
Burlington, Iowa. Second Annual Auto Show.

February 26-March 1
Mason City, Ia. Automobile Show Association.

February 26-March 1
Madison City, Wis. Automobile Dealers' Assn.

March
Philadelphia, Pa. Automobile Trade Assn.

March 1-8
Detroit, Mich. Detroit Automobile Dealers' Assn.

March 1-10
San Francisco, Cal. Motor Car Dealers' Assn.

March 3-8
Columbus, Ohio. Automobile Show Co.

March 3-8
Bridgeport, Ct. Auto Show.

March 3-8
Muskegon, Mich. Lodge 274, B. P. O. E.

March 3-8
Scranton, Pa. Automobile Assn.

March 4-8
Buffalo, N. Y. Automobile Dealers' Association.

March 5-8
Quincy, Ill. Automobile Trades Assn.

March 10-15
Omaha, Neb. Auto, Tractor and Truck Show.

March 10-15
Syracuse, N. Y. Automobile Dealers' Assn.

March 10-15
Paterson, N. J. Automobile Trade Assn.

March 15-22
Boston, Mass. Automobile Dealers' Assn.

March 15-22
Harrisburg, Pa. Motor Dealers' Assn.

March 19-22
St. Joseph, Mo. Automobile Dealers' Assn.

March 22-29
Pittsburgh, Pa. Automobile Dealers' Assn.

March 24-29
Greenfield, Mass. Automobile Dealers' Assn.

March 26-29
Watertown, N. Y. Automobile Dealers, Inc.

March 29-April 5
Brooklyn, N. Y. Motor Vehicle Dealers' Assn.

April 5-12
Montreal, Can. National Motor Show for Eastern Canada.

WELL KNOWN AUTOMOBILE MAN CELEBRATES 85TH BIRTHDAY

As a general rule we do not publish news items or personal notes unless the person or the news is of particular importance. In this case, we feel that all our readers will be interested in knowing that Mr. S. C. Johnson of Racine has just celebrated his 85th birthday.

His employes, 150 in number, gathered to congratulate him and present him with a basket of 85 roses and a pair of binoculars. Mr. Johnson retaliated by presenting his employes with $15,000 in Liberty Bonds, to be distributed on a basis of number of years service given by the employee.

Mr. Johnson, though 85 years old (or young as his friends have it), is still the active financial head of the business of the S. C. Johnson & Son firm. He spends from three to four hours daily at his office. He started in his present business when he was 48 years old, in 1882, and his concern has grown from an obscure factory to one of the largest wax polishing businesses in the world.

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The Boston Automobile Show

THE "spring styles" in motor cars did not materialize at the New York show mainly because the manufacturer did not have time enough to produce them in the interval of the signing of the armistice and the opening of the New York exhibition.

The Boston Show opening on March 15 will give most of the manufacturers just enough time to turn out the 1920 models. A month and a half will mean much in auto production and when the doors of Mechanics Building open on the 1919 show they will reveal an exhibit of cars of many new designs and many mechanical changes.

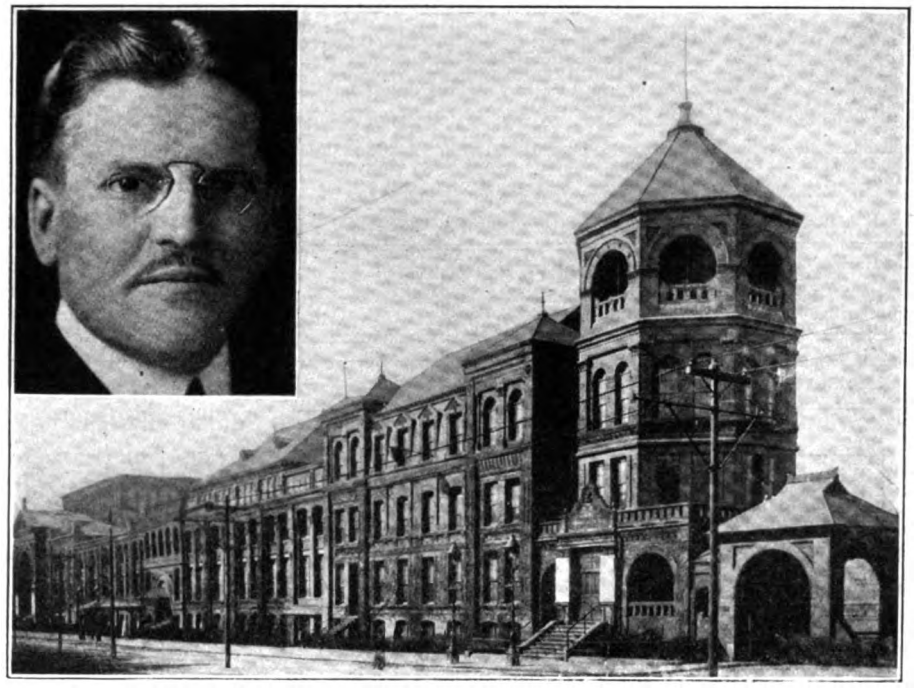
The new things will not be revolutionary. The cars will be lighter, the wheel-base shortened and the body design will be much neater and allow of more comfort. There will be greater ease and reliability of engine and machine construction. This will make the strongest appeal to the individual owner who is his own mechanic. The war has had the effect of making thousands of owners fairly expert mechanics and the tendency in construction will be in making motors, gears, brakes and other parts more available for repairs outside of the service station.

The Boston show will reveal more different makes than any of the big shows of the country. This will be due to the fact that many manufacturers will not be ready until that time to show their products.

"While we will not have an exhibition of trucks yet I look forward to the greatest crowd of buyers that ever attended a Boston show," says Chester I. Campbell, who has managed the show since its inception. "There are more new prospective buyers of automobiles in the New England market than at any other time in the history of the industry. Again automobiles are going to be scarce as it will be impossible for the makers to reach their highest point of production until June.

"The industry as a whole is filled with enthusiasm and looks for the greatest buying year in history. In a recent visit to Detroit I was privileged to look over several new designs and I understand that when the Boston show opens we will exhibit the most advanced styles yet shown by the trade."

The accessory man will as usual be about a year ahead of the motor car manufacturer in equipment. Some wonderful innovations will be shown, all adding to the ease of driving or short cuts to labor and economy. The accessory department will bring all the big manufacturers of equipment to the Boston show.



The Mechanics Building in Which Will Be Held the Big Boston Show. Insert, Chester I. Campbell, the Manager.

PROLONGED HIS JOB.

A motorist touring in a Western State got stalled in a tenacious mudhole. While making a vain attempt to escape, a boy appeared with a team of horses.

"Haul you out, mister?"

"How much do you want?"

"Three dollars."

After a long and fruitless argument the motorist was pulled to dry land.

After handing over the money the motorist said: "Do you haul many cars out in a day?"

"I have pulled out twelve to-day."

"Do you work nights too?"

"Yes, at night I haul water for the mudhole."—New Departure News.

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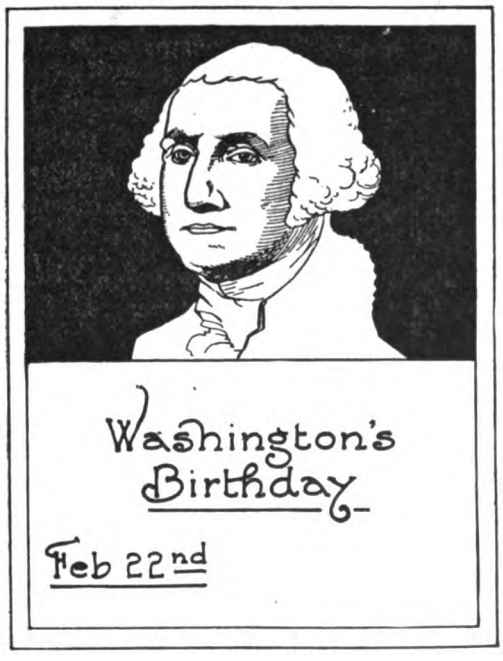
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MISSING NUMBERS.—Our readers are requested to remember that we are always pleased to re-send numbers which have gone astray in the mails.



Let Us Give Reverence.

LET us not forget to give due reverence to our first President, George Washington. In the flush of our present prosperity we are prone to feel that our happiness and welfare is wholly due to our own efforts. We forget those who have gone before, whose broad-minded policies have made us what we are.

Let us celebrate the birthday of our first President with respect and honor. We know him to have been a man who put aside all personal feelings and did only that which would make for the glory of the nation as a whole. We know that he stood for what every red blooded American stands for—Liberty and Justice.

Will You Let Your Pocketbook Rule or Will You Always Remain Patriotic?

NOW that peace has been declared, America is brought face to face with the biggest problem of the century, that of reconstruction. It is the duty of every reader to think over a few of these reconstruction problems, for they affect every individual in the United States.

On November 11th, every patriotic American went wild with joy, celebrated by ringing bells, by blowing whistles, by cheering, or if he could do no better, by throwing confetti out of his office windows. Everybody was at the height of their enthusiasm. They were 100% Americans and wanted everybody to know it.

Will this spirit remain during the coming year? You are 100% American to-day, Mr. Reader. Will you be as strong an American a year from to-day? During those troublesome days of 1914 to 1916, England, France and other nations of Europe read American reports with a sarcastic smile. America to them was a nation of "dollar chasers."

The American, to them, was a business man, cold-blooded and cool, influenced by nothing that was not preceded by a dollar sign. To the nations of Europe this attitude brought the greatest disdain. Those nations openly stated that we would not enter the war unless America could gain financially by so doing.

Germany and her allies not only thought this but were certain of it. Germany in her overbearing and domineering policies took advantage of our "too proud to fight" attitude, attributing it to the dollar influence and did not hesitate to encroach upon America's rights. She seized our shipping, murdered our citizens, still waiting with a disdainful smile.

Then came the Lusitania and the torpedoing of other defenseless boats, and America entered the great war. Did she enter it because of financial gain or because of humanity's call? Germany still claimed that America was in it from selfish motives. Many of the other European countries still brought up the same question. If America entered on the side of justice, why had she not made use of her armies before when Belgium had been devastated, when France had been burglarized and when London had been bombed?

The attitude at the time was easy to explain. America wanted to be neutral and keep out of it if she could. America is not easily excited, but when America is aroused she is like a good natured bulldog that does not

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fight unless it is necessary, but when fighting is necessary clings on until death.

Since America entered the war it has been shown that America entered the war for justice. America has sacrificed money like water. It has not been a question of cost, it has been a question of winning. We have successfully proven to the world that the dollar sign is not before us all of the time.

Fellow citizens and Americans, are we going to allow the other nations of the earth to regard us again with that same feeling? Are we going to let the dollar sign rule us in the future? No, *not* if we are *true* Americans.

Since war was declared, America has shown that she is fully capable of taking care of herself. She is self-supporting in every sense of the word. American-made tools, dyes, machinery, surgical instruments, toys, instruments, furniture, novelties at the present time are just as good as any we have imported or can import from germany or her allies.

And even if they were not, would you purchase german, Austrian or Turkish goods in the future? Do you intend to build up germany economically by purchasing her products? Are you going to renounce your patriotism, renounce your American manufacturing friend who has loyally stood behind America during the war and discard his goods in favor of enemy-made products?

If you decide in the affirmative, remember two things. First, you sacrifice your self-respect, and second you hurt your friend or your brother who is perhaps employed by a manufacturer making goods in competition with those sold by germany.

Doubtless germany can and will sell us products at a lower rate than we can purchase from our own manufacturers in some cases. She needs the money and needs it badly. She must have the money and even if she sells her goods at a sacrifice, she has conquered economically. She has successfully stifled all chance for competition from America.

By killing American industries, not only can she win the economical war in America, but she can prevent us from exporting goods. An American manufacturer cannot afford to export goods if he cannot sell his goods at home. With the importation of german products comes the question of the American working man.

You who are earning from $5 to $10 a day, are you willing to work for $1 a day again? The manufacturing business is a complex network of machinery. One business depends upon another. One business is closely interlocked with a dozen other manufacturing plants. The failure of one house puts a strain upon some other department of this gigantic machine.

No matter what industry you represent or are employed by, Mr. Reader, the effect upon you is indirect, but is harmful just the same. Foreign trade is a storm cloud. It may burst at any minute and engulf you. Unless you are willing to surrender economically to the enemy, your task has just begun.

We have won the war. We have the assassin on his back and begging for mercy. Let us not hand him a pair of steel knuckles and a blackjack, and let him up again. We can be merciful to him. Let him up, dress his wounds, but we can insist that justice be done and the assassin put in a position where he will be unable to strike us in the back as soon as he has recuperated.

Don't let our boys come home and find that their work has gone for nothing. Don't let them come home to the sound of german-made whistles, the beat of german drums, to eat with german-made cutlery and see german-made pictures hanging on our walls.

You as an individual of the biggest free country in the world can use your voice in this matter. Do your part and your conscience will be clear. Pledge yourself not to use any german-made goods that can be manufactured by red-blooded Americans in America. Pledge yourself not to let price influence you into purchasing a german article, a similar one which may be purchased "made in America."

Insure Your Car Against Theft.

EVERY car owner should insure his car against theft. It is not sufficient in leaving a car always to lock it or try to lock it. Thieves sometimes are able to get the best of any ordinary locking device, and it frequently happens that a driver who only expects to leave his car for two or three minutes does not perceive the necessity of locking it.

In New Rochelle recently a man borrowed a car from a friend to take a couple of young ladies home. While escorting them from the car to the front door of their residence the driver left the car of course without locking it, because he was only going to be a few feet away, but before he reached the door of the house a man jumped into the car and got away with it.

Some time since a lady, uptown in New York, bought a $6,000 car. After it was installed in her garage she called up the driver and ordered him to bring the car around to her house. He did so, and ran up the steps to the front door to ring the bell and notify her that the car was ready. During that brief interval a thief jumped into the car and succeeded in getting away with it.

While there are a number of different kinds of insurance that can be obtained on a car to advantage, one of the most important is to insure against theft.

A Wonderful Industry.

MOST people will be surprised to learn that there are in use in the United States to-day nearly 6,000,000 motor vehicles. The production of passenger cars for 1918 in spite of war conditions was over 900,000, and it appears that all of these cars must have been sold. It is estimated that the production of passenger cars for 1919 will probably reach at least 1,500,000.

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IN spite of laws imposing penalties and in spite of all the precautions that are taken, the number of people killed by automobiles in 1918 was greater than ever before. Fatalities in the city of New York alone were 748 as compared with 528 for the year of 1917.

The figures referred to were compiled by the secretary of the chief medical examiner, and therefore can be relied upon as accurate.

To what extent the blame should be fixed upon drivers of cars and upon pedestrians themselves it would be difficult to determine. Even the most careful man or woman sometimes experiences a temporary lapse of memory or attention and is hit by a car.

Sometimes the accident is caused by the timidity of the pedestrian who runs back and forth trying to avoid a coming car and manages to get right in the way in spite of the efforts of the car driver to avoid a collision.

People should not be confused in crossing streets; if they see a car coming and find they cannot either retreat or go ahead they should simply stand still. The driver of the car will be very likely to miss them, for nobody would deliberately run down a person standing still in the middle of the street.

Something should be done in the way of depriving careless drivers of their licenses in addition to imposing heavy fines and perhaps imprisonment.

There is no question at all that automobiles are permitted to run altogether too fast on city streets. The speed should be limited and drivers not conforming to regulations should be arrested.

Driving Without a License: A young gentleman of Newark, N. J., gently bumped the auto he was driving into another resident of that town. For a moment the first gentleman thought he would have to part with some of his money in payment of a nice, fat fine, but his victim scrambled to his feet, refusing medical attention, and bolted into his house, which was nearby. The driver was about to drive away, feeling quite happy, when the police got him, and spoiled his dream of freedom by arresting him on the charge of driving without a license.

Reckless Driving: A five-year-old child was killed in Brooklyn, N. Y., within a hundred feet of her home. She had been to a store and was returning when she was run down by a truck. The driver was arrested, charged with reckless driving.

Child Killed, Driver Released: A child was killed in Buffalo, N. Y., the other day after becoming confused in crossing the street. The driver, who claimed that she walked right in front of the machine, was released, as the unfortunate accident was considered no fault of his.

Machine Hits Train: A great many automobile accidents occur at railroad crossings; most often the driver of the automobile being at fault. Too often the driver misjudges the distance, and at the hospital the next day he listens to an account of the accident in a dazed way. The following, however, was no fault of the driver's. It occurred in Boston, Mass. The slippery condition of the street, which is on a down grade, was responsible for the accident. The flagman at the crossing tried to warn the occupants of the car, but they could not stop it; the tender of the engine, which was running backwards, struck the automobile fairly between the front and rear wheels. One man was killed, and the other badly injured.

"Want a Ride?" With some such words, a native of West Roxbury, Mass., invited a friend to ride with him. His car trundled along at 45 miles per, and turned over. The friend died two days later in the hospital, but the driver escaped injuries. He was charged with reckless driving, while under the influence of liquor.

Hits Three Machines: Before a driver of San Francisco, Cal., could be taken into custody, he had distinguished himself forever by hitting three machines on one block. It takes no great stretch of the imagination to surmise that John Barleycorn was riding with him. He was, very much so, thank you.

Girl Seriously Hurt: Crossing a street of Rochester, N. Y., in front of her school, a child was struck by an automobile and thrown with such force to the snow-covered pavement that she was all but made unconscious. One of the wheels of the machine passed over her body as she lay on the pavement. She was very seriously injured. The police blotter shows that the man was not driving his car at an excessive rate of speed. It is said that the child ran sideways into the street, and was struck and thrown under the machine.

Two Automobiles in Collision: A collision of two automobiles in Philadelphia not long ago resulted in both machines being damaged. One was hurled upon the sidewalk. The operators of the machines were arrested on a charge of reckless driving.

Crashes Into Trolley Pole: In turning out of the way of a horse and carriage, the driver of a car lost control of his car and crashed into a trolley pole. All three passengers were badly bruised, and the operator of the car was pitched through the windshield. This accident occurred in the Bronx, New York.

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A Visit to Clay County, Illinois

What Our Contributor Has Learned From a Trip to an Up-To-Date Garage in a Thriving Western Town

BY JAMES F. HOBART,

MR. HOBART," said a salesman whom the writer recently met in a Clay County (Ill.) garage, "how is it that when you have to wait a couple of hours for a train you won't sit comfortably in the hotel lobby instead of rushing around to the nearest garage and spending your time among a lot of old automobiles, old tires and other junk? Seems to me you don't look out for comfort very much?"

Perhaps the above is true, but nevertheless the writer will be found in the garage every time and he can truly say that never yet has he spent a quarter of an hour in a live repair garage without finding something well worth while—well worth being passed along to Automobile Dealer and Repairer readers. So it was this time. Just across from the hotel at Flora, Ill., is a large sign, bearing the words:

THE LINCOLN TRAIL GARAGE

The writer found that the business had developed in about three years, from a little one-man affair in a very small building, to a very large concern, employing a large force of mechanics, particularly in summer, and doing a large business in the specialties of tire and battery rebuilding and repair. The regular auto repair section was also very well equipped, a lathe, emery grinder, drill press and air pump being in evidence, together with a "rasp" wheel for grinding rubber tires and treads, a well-equipped vulcanizing room which contained about every tool and convenience necessary for rebuilding tires, a large outfit of vulcanizers of various sizes and kinds, and plenty of good work benches and overhead hanging places for tires in process of repair.

A Valve Unscrewing Tool.

On one of the benches in the tire room, and made fast to that bench, the writer saw a homemade revolving wrench arrangement for inserting and removing air valve tubes from tires, a little machine which saved a whole lot of time during the year. The machine as shown by Fig. 1 was very simple and easily made.

A piece of gas or steam pipe of the proper size was selected for the body of the wrench and one end of the pipe was forged to fit the tubes to be handled as shown at A. The other end of the pipe was fitted with a couple of elbows and nipples, one of the latter being without thread on the outer end, and rounded to act as a crank without hurting the hand. A couple of wooden blocks served as shown to attach the revolving wrench to one of the benches, the blocks being so located that the stroke of the crank came outside of the end of the bench.

When tires were to be repaired, the surfaces to be joined were cleaned thoroughly and in that work the "rasp" wheel shown by Fig. 2 played a very large part. This tool was merely a piece of tool steel about six inches in diameter and made to fit the mandrel of an ordinary grinding machine and is interchangeable thereon with the usual emery or carborundum grinding wheels.

But in this garage two separate stands for two wheels each are used, a separate stand being provided for tire work, of which one end of the mandrel is fitted with the "rasp" wheel, the other mandrel end with an ordinary wire brush. The edges of tire parts are reduced with the rasp wheel, then the "finishing touch" is given with the wire brush; which also removes every vestige of dirt from the rubber surfaces upon which it is used.

Two separate stands are used to prevent any possibility of ordinary machine repair work being done with the rasp wheel or with the wire wheel which accompanies the rasp wheel. Should these tools be used for ordinary work, grease would surely get upon the wheels used for tire work and then it would be "all off" with good vulcanizing work on tires. Hence the tire wheel stand is NEVER used by the garage men save upon tire work.

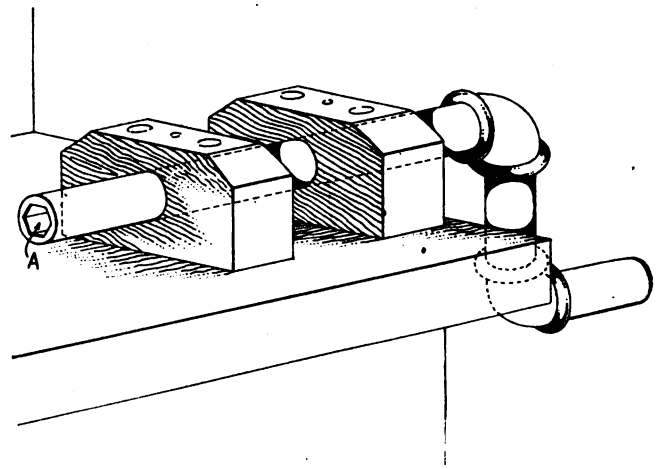


Fig. 1—A Handy Tire Valve Nut Removing Tool.

The rasp wheel is turned to shape after being annealed, then the face is cut full of raised rasp teeth exactly as a farrier's hoof rasp is cut, after which the steel is hardened. When one of these useful rasp wheels becomes worn and dull, it is quite possible to anneal and put it in a lathe, turn off the holes from which the old teeth were raised, then with a chisel, raise up some new teeth, harden the disc again, and it will be as good as a new wheel, save that its diameter is less.

A Handy Work Bench.

Almost in the middle of the garage floor was standing a bench, the like of which the writer never saw before, but which should be in every large repair shop.

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The bench was all of twelve feet long and eight feet wide. It was very strongly made of cypress lumber with maple top planks where the work was done. Fig. 3 gives an idea of this bench. Upon opposite corners are two ironworker's vises, B and I, one being an ordinary vise with five-inch jaws, the other, a huge affair with seven-inch jaws and with grip enough to hold a bull moose!

At C a pipe vise has been permanently fixed to the bench and no mechanic who has not had the use of one of these little tools can ever be aware of its great convenience and general utility. New uses will be found for a pipe vise almost every day, once one is put into use. They may be purchased for a couple of dollars and are at times worth ten times as much for a single job.

A large surface plate was located upon one corner of the bench at D, and by placing a sheet of emery cloth flat upon the clean surface of the plate a very good job of flat grinding could be done by moving the work around

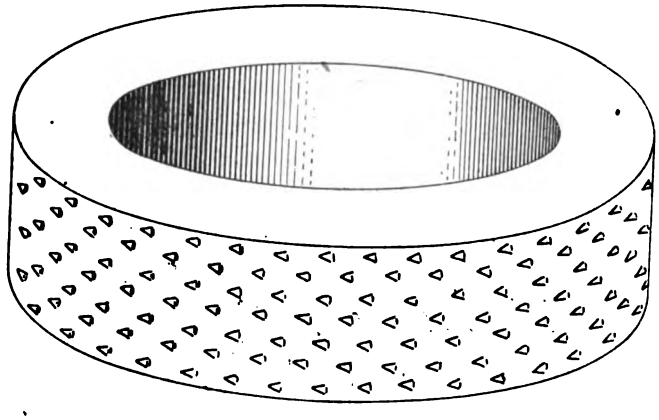


Fig. 2—A Tire Rasp.

upon the emery cloth with the fingers. Many a piston ring was ground to a fit in that manner.

A shelf about two feet wide placed at E served as a most admirable support for such tools as were to be kept at the bench all the time. But sometimes the manager looked "sidewise" at that shelf because of the hard work he had in making the workmen keep the bench and the shelf in particular "rid-up" of choice collections of junk which seemed to collect there almost overnight.

One foreman wanted to cut the big bench and place the two halves—split lengthwise—along the wall, making two narrow benches. But the manager said "no." He claimed that there was twice as much working space adjacent to the big bench as it stood in the middle of the shop-space floor, there being 40 feet of effective bench length.

"If," he said, "we split the bench and put it along the wall, then we will have only twenty-four effective feet of bench space and the ends of the two halves will amount to nothing. Then we will have only about 30 feet of floor space convenient to bench surface, while, with the bench amidfloor, there is at least 72 feet of floor space within four feet of the edge of bench surface. I'll keep the big bench," he continued, "and you lads keep the old junk off of it. That will be *your* job!"

The planks at G, under the bench, upon the girts, proved to be very handy indeed for keeping the heavier and larger tools, pipe tongs, pinch bars, etc., and there was talk of flooring over the whole space and using same for placing thereupon engine parts and such auto parts as were in need of bench work. The rack F proved a valuable feature, as upon the pins driven therein were placed hand saws and similar tools, the rack being placed rather low but far enough above shelf E that a man could reach from the far side of the bench and take down a tool hanging upon a pin on the near side of the rack. In addition there are 12 drawers in this bench as shown at H.

An Out-of-the-Way Motor.

This shop, or its repair department, was driven by an electric motor placed upon a stand which raised the motor high above the floor and almost level with the line shaft. Instead of placing the motor upon a shelf or upon a rod-supported floor or platform, it was located on top of a tall stand which was built from the floor almost to the ceiling as shown by Fig. 4 herewith.

This stand was about three feet by two feet and the shelves were all made of doubled one-inch boards gained into the corner posts and fastened therein only by toe-nailing. The shelves were as stated, made of one-inch stuff, two thicknesses being used, the grain crossed and the two thicknesses well fastened together with nails well clinched, the nails being all driven from the top of each shelf and clinched in the bottom surface.

Keeping Track of Things.

This garage, during the past four years, has been under the management of four different managers, the owner, Mr. J. M. Carney, not being able to devote much of his time to the business on account of other matters which claim his attention. Three managers having failed to "deliver the goods," the garage was, about two years ago, placed in charge of Mr. Earl McBride, a registered pharmacist, who, on account of health conditions, was ordered out of sight and reach of his own pills and poison bottles.

During the past two years, Mr. McBride has succeeded in bringing the garage to a fine condition of profitable usefulness and has introduced a number of ingenious methods of business getting—and keeping. In the accounting between the customer and the shop, blanks have been worked out and put into use which not only act as a check between customer and garage, but which enable adequate and just charges to be made for service and repairs rendered, together with the itemized cost of each operation, thereby preventing many a "kick" from the customer and many an under-charge or neglect to charge at all by the garage management.

What To Do and What Was Done.

"Many times," remarked Mr. McBride, "cars come into the garage with verbal orders to do this, that and another thing, but when the car is stripped the workmen find other things which should be done for the good of

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the car. Some cars are brought to us with orders to 'do what is necessary' and when we find a whole lot of unexpected things, the owner sometimes feels peeved and thinks we have charged him too much.

"Again, a car will be brought in with orders to do certain things only. Then when the work is finished and other things are found necessary by the owner, he is apt to 'jack us up' for not doing the 'other' things unexpectedly found necessary, but which have not been 'ordered' by the owner. In order to keep clear of both horns of the dilemma, the shop cards shown by Fig. 5 were designed and put into use and today not a job, no matter how small or trivial, comes into the shop without carrying with it a card as shown by Fig. 5."

The Shop Card.

As explained by Mr. McBride, the cards had been used singly, one being filled out and attached to each car as it passed the office. But it was stated that the single card was being replaced by a triplicate form, each being upon a different colored paper and the two topmost cards being made with carbon backs so that a single writing upon the topmost card—thick paper rather than card—would fill out the three slips just alike. Then one of the slips would be given to the owner or driver of the car, one sent to the shop with the car and the third slip or card sent to the office of the garage.

It will be noted that the slip is numbered, the one shown in Fig. 5 being No. 336. All the sets of slips will be likewise numbered in rotation and care is taken to use them in rotation, too. When a car comes in with certain things ordered, the things ordered are checked off in the narrow space at the left. These things are noted if specified, even when the order is to "fix everything."

As the car goes through the shop other things found necessary are checked off as attended to, so that a comparison with the owner's slip or the one in the office,

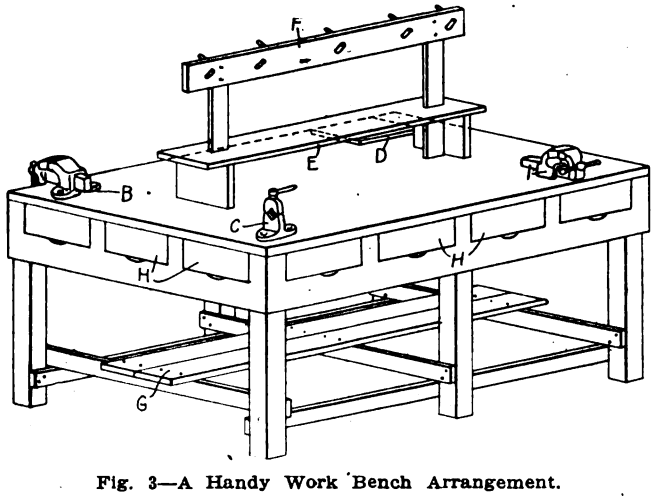


Fig. 3—A Handy Work Bench Arrangement.

with the shop slip, will show exactly what was mentioned as the car came in, also what was found and done later.

Mr. McBride stated that even the old form of single card saved a whole lot of friction and misunderstanding with car owners, for when certain things only were ordered he had required a second card to be filled out exactly like the shop card, and the second card given to the man who brought the car for repairs. The new triplicate slips saved the extra work of making another card and also made each of the three sheets a "law-proof original entry."

Each workman was required—and the requirement insisted upon—to keep accurate account of the time spent upon each of the items checked, and to make the entry for each item at the time the work was done, not afterwards when half the items and the time spent with them had been forgotten!

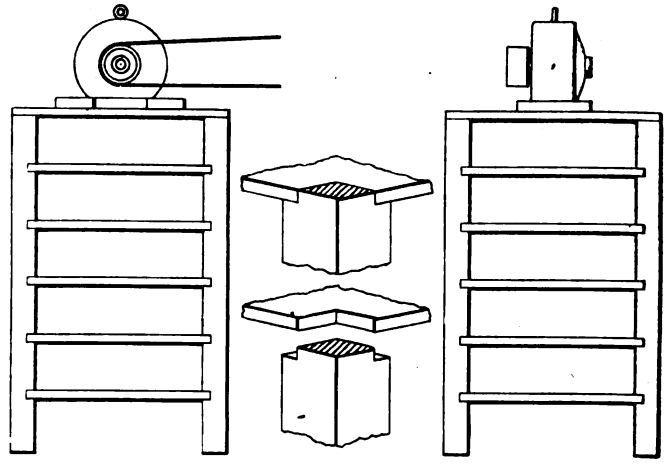


Fig. 4—The Motor Stand.

Methods of Getting New Business.

Mr. McBride obtained new business in an original and highly effective manner. He was a great believer in the personal letter as a business-getter but he stated to the writer that nine-tenths of the advertising literature which he received went into the waste-basket almost unopened and quite unread unless he knew something of the advertiser and of his offerings.

"I tried writing letters to automobile owners around the country," said Mr. McBride, "and I never got business enough in return to pay the postage. Then I worked the personal letters differently. I would slip away as I got a chance to one of the neighboring towns and stay there a few days or a week, according to the size of the place. It did not take long to meet up with most all of the automobile owners in the town and I made it my way to talk with them all and to tell where I was located and what I could do especially in regard to tires and batteries.

"About a month after my visit, having at that time found out pretty well what each automobile stood mostly in need of, I would write a personal letter to each of the men I had seen and talked with, tell them what I could do for them, and invite them to call and use my garage for their convenience when in town. These letters, I found, were read, and I can trace to that method at least $100.00 per month of new and permanent business which

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the 'personally conducted' letters have brought to the garage.

The Right Kind of a Card.

"When I visited the car owners," continued Mr. McBride, "I handed each man my card which bore the reading:

LINCOLN TRAIL GARAGE.

Battery Service Station. Batteries Rebuilt, Repaired and Recharged. Automobile Repairing, Tire Vulcanizing, Blow-outs, Rim Cuts and Punctures Repaired. All kinds of Tire Work.

FLORA, ILLINOIS.

And I found to my surprise that I could hardly get a hearing with that card. Every man looked at it but took no interest at all in me or in the matters to which

SHOP ORDER 336

Date Rec'd ..... By .....

Name .....

Address .....

Car ..... When Wanted .....

Work Ordered By .....
Sign Here

Do		By
	Car is Missing	
	Filled with ..... Gal. Gas.	
	Fill Dif. Universal	
	Grease Front Wheels	
	Fill all Grease Cups	
	Oil and Grease all Over	
	Oil Springs	
	Adjust Foot and Emergency Brake	
	Adjust Steering	
	Adjust Push Rods	
	Adjust Carburator	
	Water Leak	
	Gasoline Leak	
	Line up Front Wheels	
	Clean Plugs	
	Grind Valves	
	Take up Con. Rods	
	Check Timing	
	Fill Battery	
	Recharge Battery	
	Starter Won't Work	
	Test	

Tested out by ..... O. K. by .....

Date Finished ..... Date Delivered .....

Delivered to ..... By .....

Fig. 5—The Shop Order Blank.

the card related. After studying over the matter for a while I had some new cards printed. The 'Lincoln Garage' business was dropped off, together with most of the fine print on the new card and which read as follows:

THE TRAIL GARAGE.

We Put More Service Into Your Batteries and Tires.

Flora, Illinois.

"Well, sir, when I went around a town and handed out those cards to car owners, every man of them was interested and would talk and tell me just what was the matter with their cars and what they would like to have done—'sometime when they could afford it.' In a month or so, after passing out the new cards I would write to the parties I had seen, and lots of them came for work, and they keep coming, too. And some of the men to whom I had given one of the new cards came in for work without even waiting for me to write to them. It sure pays to get up some cards which 'Pull'!"

Welcome to the Garage!

"Another innovation which I started, and to accomplish which I had to overcome numberless objections on the part of the owner, was to keep a man all night and every night in the garage whose business it was to make welcome any car driver who might make a belated arrival. To play host to such and to do everything possible for the comfort and convenience of such 'fly by night' birds of passage."

This man did no repairing or other work save to sell gasoline and oils as required, but he would call a mechanic upon request if necessary.

The man engaged for this position was a retired automobile mechanic who was too old for active work but who had all the "know-how" pertaining to the business and who was very glad to stay all night, seven nights a week in the garage at a very low figure. Thus the garage was never closed and an extra amount of business was secured which made the objecting owner "sit up and take notice" of it!



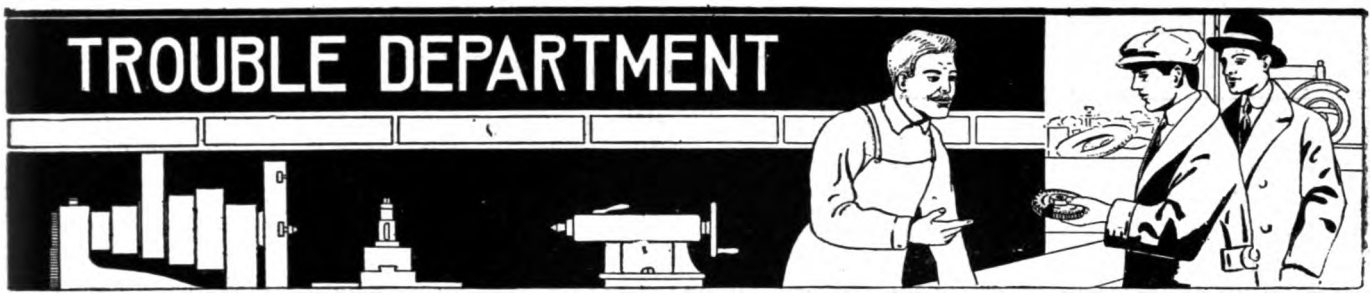
KEEP THE WINDOWS AND FIXTURES CLEAN.

FOR cleaning windows and mirrors there are several proprietary articles on the market, but a little soda or kerosene and a little thin starch put over the glass and allowed to dry will give excellent results when rubbed off and polished with a newspaper or cloth that leaves no lint. In very cold weather a little alcohol on a cloth is effectual.

Into a one-half pint bottle put two tablespoons whiting and fill the bottle with ammonia; shake well. Take a soft cotton cloth and rub on windows; let stand five minutes, then polish with a flannel cloth and the window will shine.

A solution of alcohol containing two per cent of sulphuric acid will thoroughly clean nickel plated fixtures without damage to the article. Let the articles remain in the solution a few seconds, then wash in water a few seconds. Wipe with a cloth saturated with alcohol, or, better yet, lay the article in alcohol to remove the water and dry with a clean cloth. This will clean and polish the dullest looking piece of nickelware in a few moments.

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Testing for Compression.

2602

From W. S. Griffin, Iowa.—I have a 1917 Ford car that consumes but little cylinder oil and is in fairly good condition, though it has been run 2,800 miles. I would like to know how to test the compression of this engine. When using an ordinary air gauge, the gauge would show from 25 to 35 pounds as the engine was slowly turned over. If the crank was given a quick pull, the pressure gauge would show approximately 50 pounds. What should be the correct compression? Will you tell me why the engine seems to run faster than it should when the high speed clutch is engaged? It seems to me that the clutch slips. How can this unit be adjusted?

Reply.—In testing engine compression, the gauge should be screwed into the spark plug hole. Any sort of a gauge which gives the pressure in pounds per square inch will answer the purpose. You should be able to obtain about fifty pounds pressure per square inch in each cylinder when the crank is turned.

If the engine is turned slowly and if it should lack compression, the gauge will not show so high a figure and the engine probably will not give its maximum amount of power.

If your engine seems to run faster than it should when the high speed clutch is engaged, it shows that the high speed clutch adjustment or the spring is not tight enough, and the clutch plates slip.

If you will remove the cover of the transmission at the extreme rear of the clutch assembly, you will notice three little arms which press down upon the clutch plates. Each of these arms is fitted with a set screw and the set screw held in place by a pin. Remove the pin in each set screw and give the screw one-half of a turn. Do not give one of the screws a greater number of turns than the others. The easiest way to make this adjustment is to remove the whole top of the transmission.

Generator on Grant Car.

2603

From A. R. McClune, Pennsylvania.—Is there any way that I can operate my Grant 6 car without a storage battery? Is it possible for me to install a set of dry batteries in place of the storage battery while the storage battery is being charged?

Reply.—We would not advise you to operate this machine without a storage battery. There is great danger that the generator will be burned out if you do this, nor is there any dry battery that you can use. Dry batteries are not intended for this sort of work, and cannot be used. We should advise you to hire a storage battery while yours is off the car.

2604 Installing Oversize Pistons.

From F. F. Blood, New York.—Will you kindly give me directions for installing oversize pistons in a Ford engine?

Reply.—Before installing oversize pistons, each of the cylinders should be measured. Make a series of measurements, in fact, to determine whether or not the cylinders have been worn egg-shaped. If you find that they are out of shape, you should have the cylinders rebored or reground.

If, on the other hand, the cylinders are round, install a set of oversize pistons. We cannot tell you what size pistons to use because this all depends upon the amount of wear in the cylinder. For a Ford engine the piston should be four one-thousandths of an inch smaller in diameter than the inside of the cylinder. Before you install the oversize pistons, however, you should investigate the special leak-proof rings that are now on the market. Very frequently a set of leak-proof rings are the means of saving the cost of oversize pistons.

It is very possible that you will be able to use the same connecting rods that you use at present. In purchasing the manifold is of a wrong shape or in other words a faulty casting.

Perhaps a new manifold will answer the question. Doubtless you can find some garageman who will be willing to let you try another manifold or another carburetor.

Editor's Note.—After sending the above advice to our subscriber, we received a letter which confirmed our diagnosis of his trouble. Both of the carburetors which he had tried were at fault. He installed a good carburetor correctly adjusted, and the engine now gives satisfaction.

2605 Charging Battery at Low Engine Speeds.

From M. W. K., Pennsylvania.—I have an Overland car, model 85, which is equipped with an Autolite generator. This generator starts to charge the battery at a car speed of approximately 14 miles per hour, and the current increases to 12 amperes at about 25 miles per

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hour. Is it possible to adjust the generator and obtain a charge at a mileage of from 6 to 7 miles per hour? I do not operate my car at speeds much above 12 miles per hour and the battery is exhausted in a few weeks.

Reply.—There is only one way that you can obtain battery charge at a lower car speed. That is to drive the generator shaft at a higher speed. We doubt if this change can be made without considerable machine work.

The gear on the end of the generator shaft will have to be slightly smaller, and the driving gear meshing with it slightly larger. We would suggest that you see a good machinist relative to this change. You may be able to obtain a set of gears which will work out all right. Your generator shaft should run at a speed not quite twice as fast as it does now. The machinist will be able to figure the number of teeth for you.

Any Autolite service station man should be able to adjust the current cutout so that the battery will begin to charge at approximately ten miles per hour car speed instead of fourteen. There is no way to make this adjustment for a lower speed, however, as far as we know.

Ignition Trouble.

2606

From H. K. Bentz, Pennsylvania.—I own a 1912 Overland car, model 59-T, which is fitted with a Splitdorf magneto and Schebler carburetor and lately we have been having trouble with this machine. Considerable effort is necessary to start the engine, which will run for half a minute or so, then stop, no matter what is done to the throttle or the spark lever. At the present time I have an air friction carburetor installed in place of the Schebler, but the results are the same. I have gone all over the gasoline line and am sure that the carburetor is receiving fuel. I have installed a new set of leak-proof rings and a new set of spark plugs. When the motor is cranked by hand the spark at the plug seems to be weak. Do you think that the trouble is in the magneto or in the coil?

Reply.—From your description of your trouble, we are very much inclined to think that the lack of power is due to poor ignition. As we understand you, at the present time you have a new carburetor on the machine, of modern design and which has been giving satisfaction throughout the country.

If you are sure that there are no leaks in the intake system, it is safe to assume that the magneto is to blame. We would suggest, however, that you make a careful examination of the engine. Be sure that there are no leaks at any of the joints in the system; be sure that the valve stems fit the valve guides tightly; and that the spark plugs are screwed tightly into the cylinders; also that there is no loss of compression.

Having made sure that there are no troubles of this sort, examine the magneto. Mark the magneto coupling or the magneto gears in such a way that you can return it to its place without changing the timing of the engine. Then remove the magneto. You can do this without disturbing any of the wiring. Unscrew the plugs and place them on the tops of the cylinders.

Give the magneto shaft a twirl with your hand and see if there is a spark at each plug. Then remove one of the wires leading to one of the plugs and hold it about one-eighth of an inch away from the cylinder head. The the oversize pistons, try to get them to fit your connecting rods. This will save the trouble of scraping all of the bearings.

In fitting rings to the cylinders, coat the cylinders inside with Prussian blue and slip the ring into place. The high spots on the ring will scrape off the blue. File off these high spots and repeat the operation until the ring contacts with the cylinders all the way around. Adjust the ring clearance last.

It is important that all four pistons have practically the same weight.

Ammeter on Oakland Car.

2607

From F. M. B., Illinois.—Will you kindly furnish me with instructions for wiring an ammeter in the circuit of an Oakland six cylinder model 32 car? Is there any general rule for installing ammeters upon cars?

Reply.—The ammeter is connected in the line between the starting switch and the combination lighting and ignition switch on the dash. As a general rule, you can count upon installing an ammeter on any car in the same way, providing the car is fitted with a single wire system. Practically all of the current from the generator must pass through the wire which leads from the starting switch to the ignition or lighting switch.

When installing ammeters in any car, trace the wire leading from the storage battery to the starting switch and thence to the starting motor. Then, "hands off" from this wire.

Find some small wire connection along this line which leads to a common connection on the dashboard. Cut this wire and insert the ammeter. Always bear in mind *not* to insert an ammeter in any line which originally was wired with cable larger than No. 14 gauge.

The above rules apply to practically all systems except the early Delco apparatus.

An Auxiliary Circulator.

2608

From H. R. Miller, Ohio.—I own a model 490 Chevrolet car which is giving me trouble by overheating. Would you advise me to install a water circulator similar to those used on Ford cars on this engine? How may the frame members of this car be reinforced?

Reply.—If you have trouble by your engine overheating we would strongly recommend that you use a water circulator such as you suggest similar to that designed for the Ford car, that is providing the fitting is of the same

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size as that used on the Ford. We have no records in this office which would enable us to verify the fact.

Whether it will prevent your car from overheating we cannot say. It undoubtedly will help a great deal. Water in circulation does not overheat readily, whereas water in thermo-syphon system will overheat very quickly if the amount of heat in the cylinders is at all excessive. This is particularly true when the car is slanted as it would be in traveling uphill.

The rear end of the frame can be strengthened by inserting oak strips between the flanges of the channel iron section. This is the cheapest and simplest method you can use. If you desire to reinforce the cross members, use regular channel iron such as may be obtained at any building construction supply house.

2609 **Probably a Damaged Fly-Wheel.**

From Mr. J. B. Fassitt, Maryland.—I have a 1918 Mitchell car, model 40. In traveling over a stone culvert, a projecting rock hit the flywheel and since that time there has been a knock in the engine which does not seem to interfere with the engine action. I have driven this car about 1,500 miles since the accident and have noticed that the knock disappears at times. This same engine seems to skip in two cylinders at low speeds, but at speeds of approximately 30 miles per hour or over, it operates satisfactorily. I have had the valves ground and the carbon removed, but the trouble still remains.

Reply.—Your trouble with your Mitchell car may be due to the fact that you have strained the flywheel, or broken off one or more of the flywheel studs.

We should advise you to take down the engine and examine this unit. It will be best for you to remove the crankshaft and center it. Be sure that it is not bent and be sure that all of the main bearings are solid. It is very possible that one of the main bearing housings has been cracked. Do not run your car until you have located the trouble.

The skip in the cylinders is probably due to air leakage around the valve stems or in the manifold, or manifold joints. Probably the whole engine was badly strained when the flywheel hit the rock.

2610 **Repairing Broken Water Jacket.**

From Thos. Seay, Texas.—I have a Brush car, the water jacket of which is cracked, due to frozen water. Is there any way to repair this?

A small crack in the cylinders may be repaired by the use of copper sulphate. This chemical is in crystal form and is sometimes called "blue vitriol" or "blue stone."

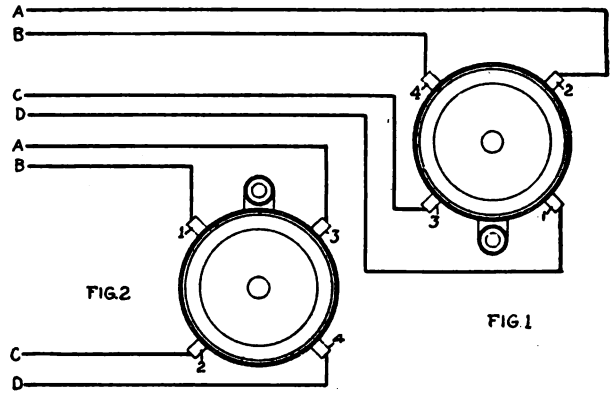
In using it dissolve as much as you can in one quart of warm water. Remove the cylinder and pour the liquid into the jacket. At first it will probably leak through the crack. Turn the cylinder in such a position so that it will. Catch the liquid in a glass dish and return it to the cylinder. After a short time the crack will be filled with a deposit of copper.

If you find that you are unable to repair the crack by this method, write to the Solderall Co., 129 Sussex Ave., Newark, N. J., as well as the Peters Engineering Co., 3202 Chestnut St., Philadelphia, Pa. The latter corporation manufacture a solder which will melt at 300 degrees of heat and can be applied with an ordinary painter's blow torch. You may be able to make a repair with this product without removing the cylinder direct from the engine.

2611 **Timer Upside Down.**

From E. V. Dubs, Pennsylvania.—I have a 1917 Ford car which does not seem to work well or give any power, although everything seems to be in good condition; the ignition system is not defective and there is no carbon in the cylinders. The engine does not pick up when I advance the spark but seems to pull much better when the spark lever is retarded.

I am also having trouble with headlight bulbs which



Timer May Be Inverted. Timer Rod Connection Should Come at Top.

burn out very quickly. They will burn brightly for a few minutes and then go out.

Reply.—Your trouble is undoubtedly due to the fact that the timer is installed bottom side up. That is, the timer connection with the spark advance lever is at the bottom rather than at the top as shown by the accompanying diagram. If this is the case, you will have to remove the four timer wires, turn the timer the other side upwards and replace the wires in the same relative positions, but with diffrent posts.

The diagram herewith will show you by comparison just how to make the proper connections. Notice the way the wires are in each diagram and the way they are connected with the posts.

The light bulbs which you are using are not high enough voltage. Purchase lights which are rated two or three volts higher than the ones you have and you will have no trouble.

2612 **Fitting Piston Rings.**

From Wm. A. Leas, Ohio.—I have a Buick model B-25 car 1914 model. The engine has very poor com-

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pression despite the fact that I recently installed a set of piston rings. I was careful not to leave any space between the ends of the rings to prevent any chance for leakage.

There is a knock in the engine which seems to be in the third cylinder. Can you suggest the possible trouble?

If the car is equipped with oversize tires 33x4, will it give less power than with 32x3½ tires?

Reply.—You probably did not install the piston rings properly. In installing a piston ring, you should be careful to fit each ring to the cylinder in which it is to be applied. The cylinder should be coated with Prussian blue, and the ring slipped into place upon a wooden dummy piston. The Prussian blue will wipe off upon the high spots of the ring. These high spots should be scraped off with fine emery cloth. The operation should be repeated until the ring contacts with the cylinders all the way around.

Be sure that the cylinders are not egg-shaped and be sure that they are not scratched or scored. If the piston rings are tight in the cylinders, it is very improbable that the pistons will knock. The pistons should be .004 smaller in diameter than the rings.

You should leave the clearance between the ends of the piston ring about the thickness of a piece of newspaper. You must do this or there is great danger of spoiling your engine. Do not be afraid that the gas will leak through these tiny places. It will not, if you space the rings so that the joints in the rings come at opposite points on the piston.

The knock of which you complain is probably due to a loose bearing, or it is possible that the crankshaft is not properly aligned? Without further details we can help you but little.

When a car is equipped with 32 inch tires it will give slightly more power than if oversize tires are applied. The difference is so very small, however, that it is not noticeable.

Leak in Intake Line.

2613

From F. L. Eicholtz, Illinois.—I have a 1916 car which has been run about 3,000 miles. The engine does not give satisfaction, in that it will not operate upon all four cylinders all of the time. It will not idle properly and requires constant readjustment of needle valve for different speeds. If the throttle is opened slowly, the engine will load up with gas at times, and at other times will backfire through the carburetor.

At a speed of 35 miles per hour, however, it seems to operate and give full power, but if the throttle is closed and opened again the gasoline must be readjusted before it will fire upon all four cylinders. The engine will not accelerate nor throttle smoothly, even after it is well heated. The valves have recently been ground and the magneto examined and the plugs are in good condition. I have tried two carburetors, but the trouble still persists.

Reply.—In the first place, it would seem that all of your trouble is caused by leak or leaks in the intake line at some point between the valves and the carburetor.

Remove the manifold and put in new gaskets, coating the gaskets well with orange shellac. See that the valve stems fit the guides properly. Only a short time ago one of our subscribers had practically the same trouble. He claimed that he had just put in new valve guides, but the writer of this letter inspected his car, and found that eight out of twelve of the guides were loose upon the stems. A leak of the sort we mention can be located very easily by squirting gasoline at various points on the engine and noting the effect upon the engine action. Try to borrow another carburetor which has a larger inlet connection. It is possible that both the carburetors you tried were at fault.

Clean the exhaust line, and be sure that no back pressure is formed. If the trouble still persists, evidently it is due to faulty engine design. It may be that magneto should generate enough current to leap across a one-eighth of an inch gap. The spark should be white and hot. If it is not, the magneto is at fault.

Remove the distributor cover and clean the distributor brush and the segments. Wipe off all of the grease, oil and dust from between the magnets and from the exterior parts of the machine. Examine the breaker points and see that they are smooth and flat, and that they contact their whole face when they are together. If they are pitted, or if they do not touch together properly, new ones should be put in their place. When the breaker arm is riding on the top of the cam, the breaker points should be separated not more than .25 of an inch.

If, after having followed these directions, the magneto does not generate sufficient current, we should advise you to return it to the service station or the factory for repairs. There is no way of telling whether the trouble is in the coil or in the magneto except by a series of experiments. Only the service station expert or the factory can tell you what the trouble is.

Not Universal Joint Trouble.

2614

From Walter H. Croft, Illinois.—I have a Buick little 6 car, 1917 model, which has a jerky action when traveling at a speed of less than eight miles an hour. My garageman says that this action is caused by lost motion in the universal joint, but so far has been unable to remedy the trouble.

What do you think about it?

Reply.—According to your description we are inclined to think that your trouble is in the engine, not the universal joint. As a matter of fact, we cannot see any reason why a universal joint would cause such an action no matter how much lost motion there was in it, unless of course you kept speeding up the engine and slowing it down rapidly. As long as the engine is pulling straight

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ahead the universal joint is twisted as far forward as it will go.

You can verify this fact by running the car at a low rate of speed up a small incline. You will probably find that the jerky action is noticeable just as much as when the car is operated on level ground. Your trouble is either caused by poor carburetor adjustment or leaks in the intake line. Be sure that the spark plugs are all tight and be sure that the guides around the valve stems are tight. Remove the manifold and use a set of new gaskets together with plenty of orange shellac in replacing them. All joints between the carburetor and the explosion chamber must be tight, or the engine will not pull properly. Try to borrow another carburetor from the garage man and see if your trouble ceases with the installation of the new carburetor.

If, after having followed all the above directions you still have trouble, examine the ignition system. It is very possible that there is a loose or grounded wire at some point in the system. If you still have trouble let us hear from you again, and we will advise you further.

2615 Lack of Power in Maxwell.

From H. E. Whisker, Pennsylvania.—I would like to know why my 1918 Maxwell car which is geared four to one does not have the pulling power that it did when I first purchased it. I have examined the engine and there does not seem to be much carbon in the cylinders.

Kindly give me any information that you can relative to loss of power.

Reply.—In the first place, we would suggest that you make a series of experiments to determine whether the trouble is in the ignition system or in the gas system. Remove all of the plugs and place them upon the top of the cylinders, leaving them connected with their secondary wire which connects the coil with the center of the Atwater-Kent distributor. Hold this secondary wire 3/16 of an inch away from the cylinder head while somebody cranks the engine.

If the ignition system is in good condition, you should obtain a fat, hot spark between this wire and the cylinder head. Do not separate the wire from the cylinder head more than 3/16 of an inch nor do not turn the engine over without leaving a path for the secondary wire, either through the plugs or through this wire to the head. You will probably find that the ignition system is all right. If you cannot get a 3/16 inch spark, write us again.

Our opinion is that your trouble is in the gas system. You claim that the compression is good. Compare the compression with that of another car of the same year. The compresion should be at least 60 lbs. per square inch. If it is not, you have located your trouble. See if you can obtain more power by disconnecting the hot air carburetor connection. After the engine is started you will get considerable more power by using cold air through the carburetor. Try to cut down on the gasoline.

From what you say, it would seem that too much gasoline is being used, or not enough air.

It is possible that the choker valve is not fully open. Examine the intake line between the carburetor and the engine. Be sure that there are no leaks in it. Pay particular attention to the bushings around the valve stems. If it is possible, we would suggest that you borrow a carburetor of another make and try it out.

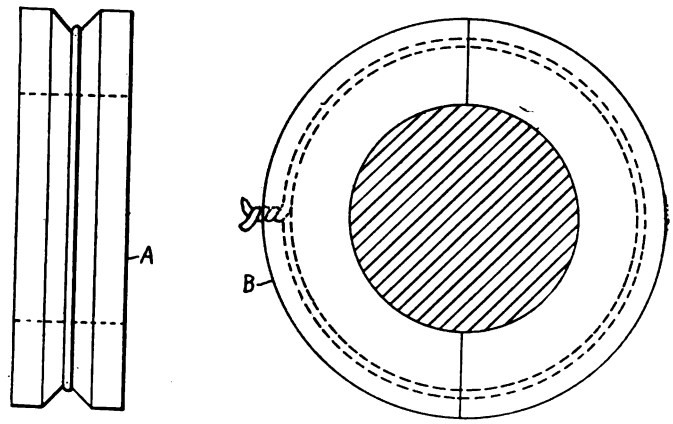
Make a series of notes of your different experiments, and let us hear from you again.

2616 Main Shaft End Play.

From C. E. Davis, Virginia.—I have a 1915 Ford car which has recently been overhauled but there is quite a little end play in the crank shaft, about 1/16 inch in all. This seems to cause trouble in the magneto since that unit will not generate current enough to start the engine. Is there any way for me to apply a washer to the crank shaft, without removing the whole engine from the car?

Reply.—There are two methods whereby you can take up the end play in the crank shaft. This end play is usually prevented by the width of the main bearings, that is, they are fitted to the journals so that the shaft cannot move backward and forward through them. You can replace one or more of the main bearing caps to compensate for this end play.

There is another and easier way to accomplish a result, however. That is to insert a split washer between the main bearing and the flywheel flange. As a matter of fact it would be practical to insert a washer behind any of the three main bearings. After the split washer has been fitted carefully so that it will not bind upon the shaft, cut a groove all the way around the circumference about one-eighth of an inch deep, put the washer in place, and in this groove tie a piece of fine steel wire. Twist the wire around three or four times, tying it each time. The sketch accompanying shows just how the washer can be tied in place.



How the Repair or Trust Washer Can Be Made and Applied Without Disturbing Crank Shaft.

The steel magnets in the magneto should have a clearance the thickness of a postcard from the electro magnets.

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2617 **Degrees in a Circle.**

From J. L. Smith, Ohio.—Will you please tell me how the degrees in a circle correspond with the minutes on a clock face?

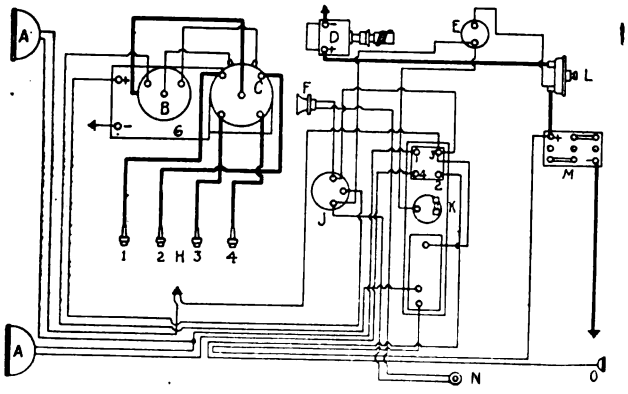
Reply.—Every time the minute hand of a clock moves one minute it has moved six degrees. When the minute hand is moved to quarter past the hour, then it has moved 90 degrees, or just a right angle. A circle is divided into 360 degrees. A right angle is 90 degrees. When the minute hand shows half past the hour it is just 180 degrees past twelve o'clock. You will notice that when we speak of degrees in the Automobile Dealer and Repairer magazine as applied to valve opening, we say, for instance, that an exhaust valve opens 45 degrees before bottom center.

This would mean that if a pointer were attached to the crankshaft, and the piston were brought to the top of its stroke, so that the pointer would be at twelve o'clock, the pointer would have to move downward until it was between seven and eight minutes before half past.

In other words, the exhaust valve would open 22½ minutes past the hour, and at half past the hour the piston would reach bottom center, or the lowest point of its stroke.

2618 **Wiring of Chevrolet 1918 Car.**

From an Alabama Subscriber.—Will you kindly give me a wiring diagram of the 1918 Chevrolet car?



Wiring of Chevrolet Car.

Reply.—Wiring diagram is given herewith.

2619 **1915 Briscoe Valve Timing.**

From H. Aubinoe, D. C.—Will you kindly give me the valve timing on a Briscoe 1915 three passenger clover leaf roadster car?

Reply.—The exhaust valve on the 1915 Briscoe car should open 47 degrees before bottom center. In order to check this figure you will notice that the exhaust valve closes five degrees after top center, and the intake opens at dead top center; and the inlet closes 45 degrees past bottom center. This covers Model A machine.

2620 **Legal Questions.**

From P. Pearson, Minnesota.—Will you kindly give me some advice on the following legal questions?

(1) Must a car owner have a chauffeur's license to use his car for livery purposes?

(2) If I hire a driver must he have a license?

(3) How does the law apply to garages that run livery in connection?

(4) How is the Minnesota Lien Law regarding the filing of a mechanic's lien? Before how many days must you apply same?

(5) Is the Anti-Glare Law a State law or is it local?

Answer.—(1) Under the laws of Minnesota any person (including owners) who drives a motor vehicle for hire must have a "chauffeur's license." This license is issued by the Secretary of State only after due application is made to him, and after the applicant has satisfactorily passed an examination as to his "knowledge of the construction, mechanism and operation" of automobiles. The fee is $2.00 and the license must be renewed every calendar year. The applicant must be over 18 years of age.

(2) If you hire a driver he must certainly have a "chauffeur's license."

(3) The same ruling applies to garages run in conjunction with livery stables.

(4) A mechanic's lien, sworn to by the lienor, must be filed in the proper register's office within 90 days after the last item of work or materials has been performed or furnished on the job. An action to foreclose the lien must be started within the year, and in case the property is sold on foreclosure, the owner has one year within which to redeem it upon paying all costs and expenses to date of redemption.

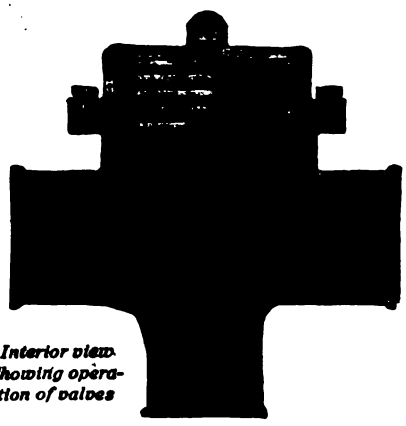
(5) We can find no state statute regarding "anti-glare." It is probably controlled by local ordinances. If you will inquire of any police officer, you can probably learn all about it.

2621 **Too Late.**

From W. W. G., Pennsylvania.—I wish that you would give me some legal advice on the following case:

A owns a garage building and all the equipment, that is, all the tools in it, and A sells this equipment to B and B rents garage building and operates a service station there, and C has an agency for a car and a truck attachment but C has no service station and B asks C for his service work on the cars and coupling up these attachments, and C gives it to B, and B asks C to put in some supplies for these cars and attachments and C puts in some supplies and during the time B has been doing C's work B asks C to buy some of his equipment, that is, some of the tools, as he needed a little cash, and C buys and gets a receipt for the number of articles bought and amount paid for them and C agrees to let B use these tools as long as B does C's work. And then

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Interior view. Showing operation of valves

For cold weather gasoline economy you will see the real value in the

Rayfield Motor Thermostat

Every motor wastes gasoline until the cooling water is heated to 170°. The driver without a Thermostat must keep on the "choker" until three to five gallons of water are heated to 170°. The waste of fuel is considerable.

How It Works

With the Rayfield Motor Thermostat, there is no circulation of cold water around the engine. The pump circulates the cold water from radiator through a by-pass without disturbing water surrounding the cylinders.

When the water around the cylinders is heated to 170°, Rayfield Thermostat gradually opens—permitting pump circulation to enter motor block.

In the Thermosyphon system, the same action takes place except that no by-pass is required and no circulation of water occurs until Thermostat opens.

Summer Smoothness

The effects of the Rayfield Motor Thermostat are immediately apparent to the driver. Instead of having a spitting carburetor and a missing motor for ten to fifteen minutes on a cold morning, the engine is running with summer smoothness within two or three minutes.

When the car is standing, the Thermostat closes as soon as water temperature is reduced to 170°. Thus the water around the motor remains warm longer.

For Thermosyphon systems, the price, including all fittings, is $15.00. For pump circulation systems, the price, including all fittings, $17.50. Installation is simple. Garages and dealers handle it.

For maximum efficiency the

RAYFIELD CARBURETOR

—on which we have resumed production, quality and deliveries as of old.

The correct Rayfield secures not only marked gasoline economy, but will put new pep and life into the motor.

Sales and Service Stations Everywhere

Findeisen & Kropf Mfg. Co.
21st and Rockwell Sts. CHICAGO

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along comes A, the landlord, and issues a landlord's warranty of distress, and that is for rent B owes A. Are all C's articles, tools and supplies subject to A's levy, and can constable sell C's supplies and tools if C serves a notice on constable ten (10) days before the sale on the day constable puts up his sale bill. Now I am C in this case and I don't like to lose this stuff.

Reply.—You are in an unfortunate predicament and need a competent lawyer to extricate you if it is possible to do so. I believe that in Pennsylvania a landlord can seize upon goods of a stranger found upon the premises unless exempted by some rule of law. Whether you are within the exemption requires investigation and consultation. This is another case of "locking the door after the horse is stolen." In the future bear in mind that $10 worth of advice before you enter into business relations with another person is worth more than $100 of fees after the damage is done. Ignorance of the law excuses no man.

NEW AND INTERESTING THINGS IN MOTORDOM

Johns-Manville Fire Extinguisher.

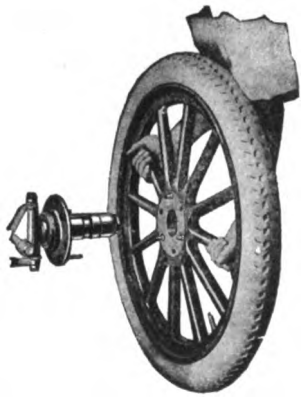
Every automobilist realizes that no matter how fully his car is protected by insurance, he can never actually replace the machine without a loss, and so it devolves upon him to protect himself with some sort of fire extinguisher.

The garageman realizes that he is responsible for the cars in his garage, whether they belong to him or not, and he, too, should see that the garage is adequately protected. Water is not a good gasoline fire extinguisher.

There is a fire extinguisher on the market, however, which will extinguish gasoline fires. This device is sold by H. W. Johns-Manville Co. of New York City, and can be obtained at practically any accessory store. The device has many novel features. It is used in the same manner as an ordinary air pump. Pressure can be pumped into the tank and the stream controlled from beneath by a special lever. A chemical is used in the device which the manufacturers claim will not corrode metals, will not freeze, and will not damage the finest fabrics.

E-Z-Way Outfit.

Every Ford owner who desires to bring his machine up-to-date, should investigate the E-Z-Way demountable wheel outfit which is being manufactured by C. A. Schwartzman, 2610 Atlantic Avenue, Brooklyn, N. Y. This outfit is used in conjunction with the regular Ford wheels, thus saving the cost of new ones. The regular Ford hubs are removed and two special



E-Z-Way Demountable Wheel.

flanges applied. An E-Z-Way hub is placed upon the spindle or axle.

This installation having been made, all of the wheels are interchangeable. To remove the wheels, one need but unscrew three nuts. Then the wheel may be taken from the fitting and replaced with a spare wheel which is furnished with the outfit. Aside from the fact that time can be saved in road repairs, there is another outstanding feature.

With the outfit there is no danger of getting the bearings dirty while making the change. The cost of the whole outfit is little more than the cost of a single Ford wheel. The E-Z-Way outfit can be obtained for use on Ford delivery cars or trucks.

Fred D. Williams Now General Manager of the L. H. Gilmer Company.

Mr. Fred D. Williams, formerly head of the Power Specialties Department of the H. W. Johns-Manville Co., who associated himself with the L. H. Gilmer Co. of Philadelphia as assistant general manager on April 29th last, has now been appointed general manager.

Mr. Williams' promotion is a logical continuation of his previous successes and is particularly appropriate inasmuch as it involves no severance of established trade acquaintances.

The products of the L. H. Gilmer Co., which will now be produced under the management of Mr. Williams, have grown in importance as allies of motordom, until to-day perhaps 90 per cent. of all automobiles and tractors produced in America carry one or more Gilmer products as regular equipment. Gilmer Woven Endless Fan Belts, Woven Webbing, Tape and Straps, Top, Stay, Tire, Curtain and Rebound are all well and favorably known.

The L. H. Gilmer Co. also manufacture a rapidly increasing volume of woven power belting.

Bearing Catalog.

The Gwilliam Co., 254 W. 58th Street, New York City, have just brought out their 1919 bearing catalog which should be in the hands of every repairman in the country, for the very reason that it gives the bearing sizes carried in stock by the above company.

This company manufactures ball bearings of every type including the thrust, cup and cone, annular and double annular, roller bearings of the straight and taper type, as well as special roller thrust bearings.

The whole list comprises bearings for practically any installation. In addition to standard bearings of various sizes, the Gwilliam Co. list in their catalog the standard sizes of steel balls which they carry in stock.

A Dealer's Help.

The Handsome Cut-Out illustrated herewith, in reduced size, is very effective for use in making Window Displays, or for Counter and Show Case Display. It is attractively printed in five colors, 10½ inches by 14 inches in size, with easel back, and the slogan "Every Spark,—a Bark" catches the attention of motor users, and brings them into the store for more information about National Spark Plugs.



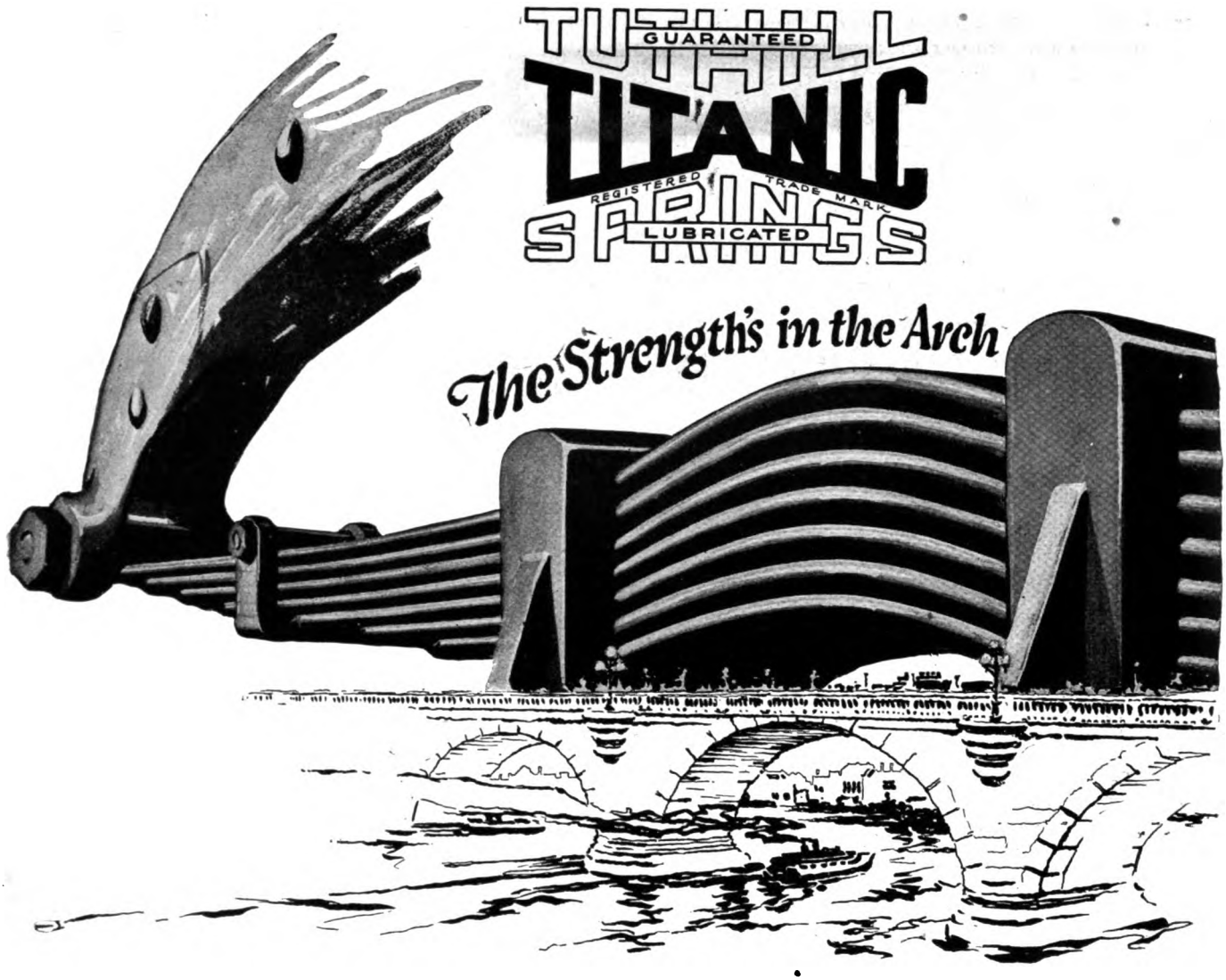
The National Spark Plug Display Card.

This new Dealer's Help is now being sent to every National Dealer by the Bergie National Spark Plug Co., Rockford, Ill., and those dealers who have already used it for making Window and Counter Displays have found it a "Silent Salesman" that never fails to attract attention, excite interest and increase the sales of National Spark Plugs. If you are a National dealer don't fail to wirte at once for one of these attractive Cut-Outs to help increase your sales. It is a dealer's help that brings most satisfactory results.

Nathan Novelty Moves to New Location.

The Nathan Novelty Mfg. Co., formerly of 84 Reade Street, New York City, moved to their new factory at the corner of 5th Avenue and 12th Street on February 1st. This change was due to the fact that their business has been growing very steadily and their new factory gives them increased facilities.

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Built Like a Bridge to Stand All Shock

AS early as 4,000 B. C. men faced the danger of "center break." The tendency of an arch is to sink in the center. Engineers have had to fight for center strength.

* * * *

Tuthill Titanics are the spring with the ***unbreakable*** center. Guaranteed at all points and in every respect for one year, they are guaranteed ***forever*** against center breakage — where three out of four old style springs break first.

* * * *

Tuthill Titanics are built strongest to wear longest where other springs give way first. A resilient arch of steel meets and absorbs every shock with swift response and sure strength. No center holes or nibs weaken this unbreakable center. There are no bolts to shear off. Patented "wedge" and "yoke" plates hold like a vise.

* * * *

Utmost convenience in spring replacements, the confidence of your customers and steadily increasing sales are yours when you handle these famous springs. There is a guaranteed ***"Titanic" for every make of car.***

* * * *

See "Chilton's" or "Auto Trade Directory" for complete list of Distributors.

Tuthill Spring Co.

ESTABLISHED 1880

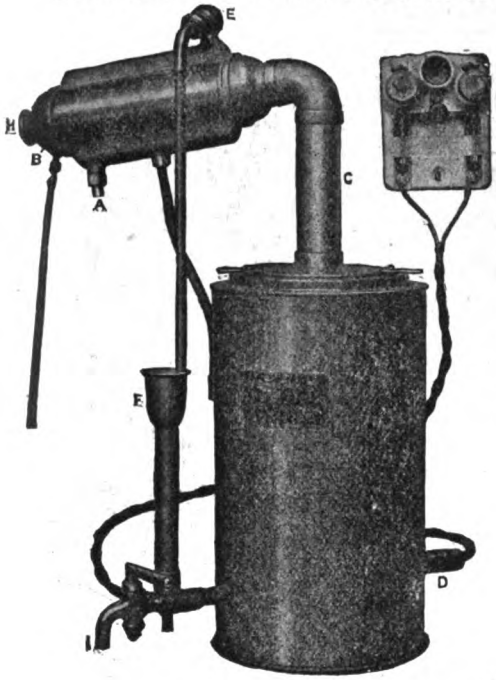
760 Polk St. Chicago, Ill.

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Barnstead Stills.

The attention of our readers is called to the line of stills and sterilizers being manufactured by the Barnstead Still & Sterilizer Co., 2 Lanesville Terrace, Forest Hills, Boston, Mass. This line of stills is very large and the stills may be operated from electric current, gas or kerosene.

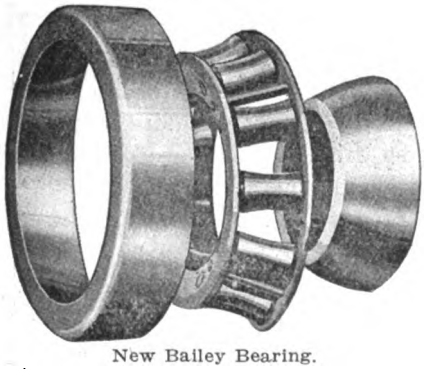
The water is said to contain but one part of mineral matter in a million parts of water. The Edison Storage Battery manufacturers recommend the use of water distilled by this apparatus for their batteries. The cost of operation of the stills is extremely low and it is claimed that the water can be used economically for drinking purposes in the garage.



A Barnstead Still.

A Distinct Departure in Roller Bearings.

Departing from the usual type of roller bearing design the Geo. D. Bailey Co., makers of the Bailey Ball Thrust, have placed on the market a front wheel bearing for Ford and Chevrolet 490's under the name Shafer Roller Bearing that eliminates the chief source of front wheel bearing trouble, namely the inability to take a heavy thrust (sideway) load without damage to the bearing and take care of axle spindle deflection as well.



New Bailey Bearing.

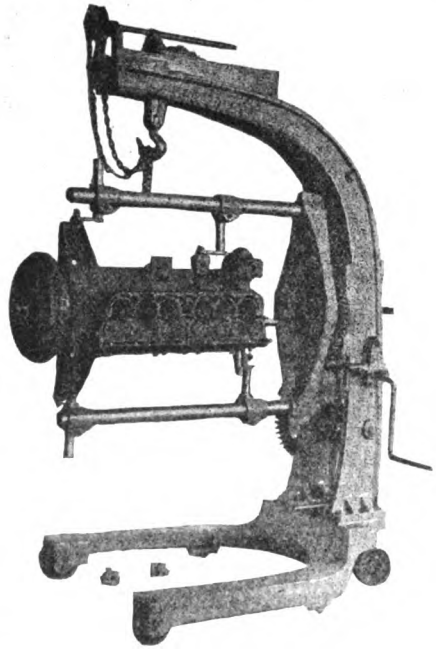
The outer surface of the inner cone is convex, having the contour of a perfect ball, and the rollers possess a concave surface, thereby forming a cradle as it were for the cone and allowing it to swing to meet any deflection of the spindle when same gets out of alignment. The cone being free to move with the spindle and the load being taken upon the full length of the rollers causes no strain or binding of bearing itself as in the case of the rollers of a bearing the cone of which is held perfectly rigid and cannot meet the misalignment or deflection of spindle.

The concave surface of the rollers at all times presents an equal load-carrying surface both from the side as well as the top and therefore the bearing is able to accept thrust (sideway) loads equally as well as radial (downward) loads. This feature in itself is a distinct departure and permanently stops the real source of front wheel bearing trouble.

Moreover, nothing but the highest grade chrome nickel alloy steel is used throughout. This fact coupled with three years of most severe road and breakdown tests enables the makers to guarantee every Shafer bearing without reservations.

Portable Floor Crane and Hoist.

The Canton Foundry & Machine Co., of Canton, Ohio, have just developed a piece of garage equipment which is meeting with the approval of many engineers. The outfit is a combination crane, hoist, truck and complete work bench, designed especially for the handling of engines. The outstanding feature of the device is its flexibility. With it the engine may be removed from the chassis, hooked to the stand, and taken to any part of the machine shop or garage.



Portable Floor Crane and Hoist.

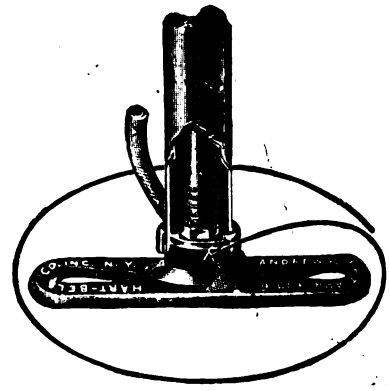
Since the device can be revolved, the engine can be reached easily. The hoist has a capacity of two tons and a lift or clearance of 6 feet 4 inches. The crane is equipped with Hyatt roller bearings and finished by expert workmen. The accompanying illustration will give the reader an idea as to just how the machine appears.

The Hart-Bell Pump.

We illustrate herewith an air pump of novel design, termed the Hart-Bell and manufactured by the Hart-Bell Co., Inc., 1926 Broadway, New York City.

In the base of the pump there is a cone shaped form and the bottom of this cylinder follows the shape of this cone, resulting in a flare. At every stroke the leather bucket on the piston is flared out over this cone to a size larger than the cylinder of the pump, always insuring a tight bucket.

When the pump is not in use the leather bucket is kept in shape due to this construction. In other words, it is very much like a pair of shoes that are kept in shoe trees when not in use to keep them from curling up.



Partial Section of a Hart-Bell Pump, Showing Patented Plunger Bucket.

Will Make New Type Bearings.

The Perfection Roller Bearing Co. has been formed to place on the market new types of roller bearings, among them a non-lubricating bearing, also a bearing to install on badly worn Ford rear axles. C. M. Carr, a former automobile trade publisher, heads the organization as president, and William R. Bullion, formerly with the Elgin Motor Car Co., is secretary.

The company's headquarters are located at 117 N. Dearborn Street, Chicago, and the factory is at Englewood. Mr. Carr states that the new organization will have something distinctive to show the trade by show-time and will exhibit at Milwaukee and Chicago. The company seeks business among the large users of bearings on models designed especially to fit customers' equipment. A catalog line for replacement work will eventually be sold through jobbers to the repair shop and garage trades.

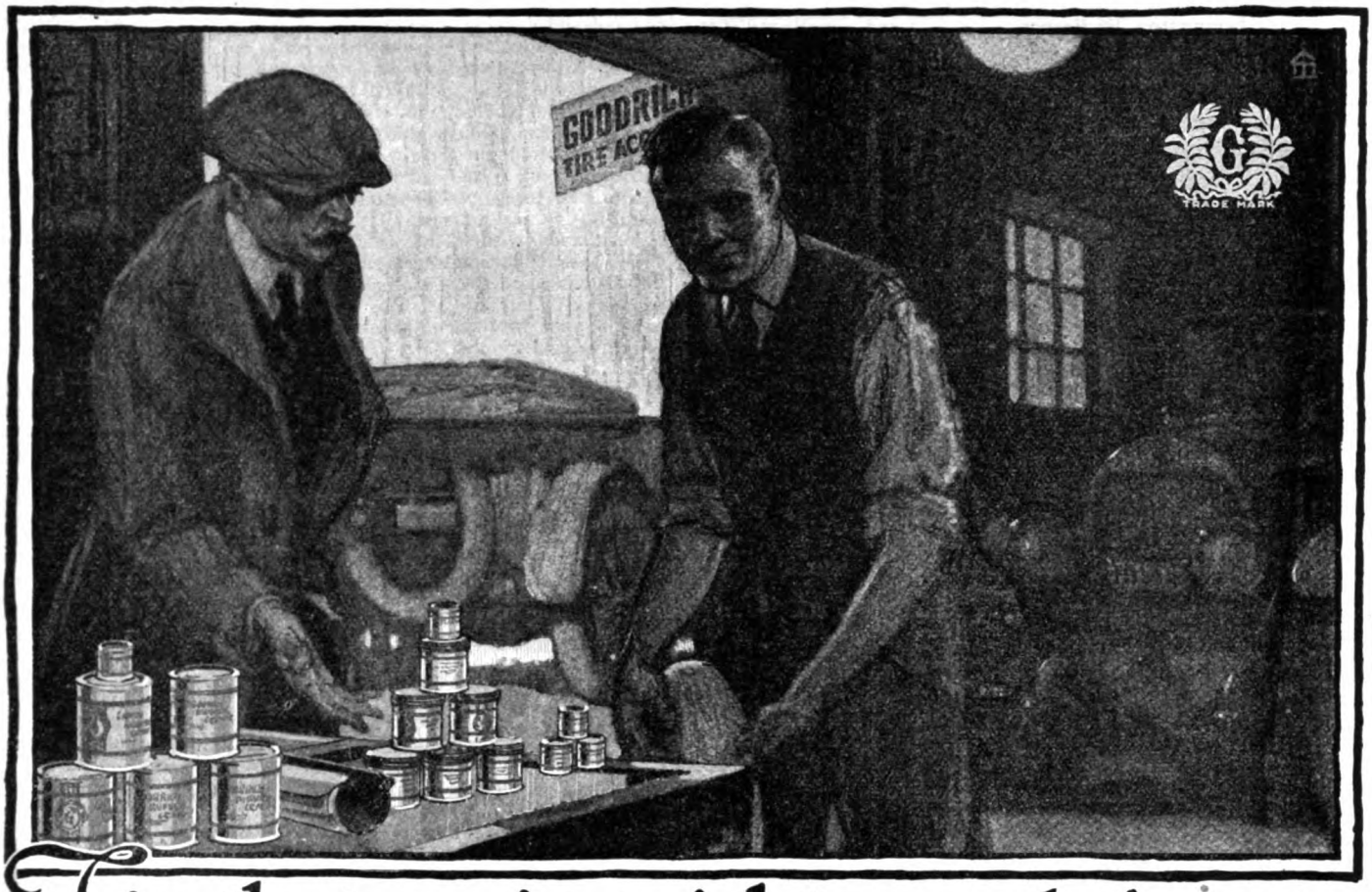
Re-Painting Outfit.

Now that the Spring season is near at hand, the automobilist is working upon his car to put it in condition for the coming season. Doubtless many of our readers do not feel like paying out a great amount of money to have their cars re-painted. As a matter of fact, any car owner can paint his own car very easily and obtain a hard finished paint surface with but little effort.

The F. O. Pierce Co., 12 West Broadway, New York City, manufacture and sell what they choose to term as their "automobile painting system," consisting of three cans of automobile paint, color and finish. They claim that this system of painting can be applied in three days.

On the first day, the under coat or filler is applied, on the next the color and body coat, and on the third day the varnish or finish. With their outfit are furnished two brushes and three sheets of sand paper. Finish may be had in black and twelve colors and the colors are said to cover the old paint on the car.

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Fix that casing right—and give me some of those GOODRICH Patches

The National Thrift Habit has come to stay.

Motorists this year are going to insist upon good repairs—with the best repair materials—and they will demand for their own use a *known* brand of tire accessories.

Goodrich Repair Materials are by far the best and most economical in the long run for tire repairers. If no where else Goodrich Quality surely counts here. Your reputation depends on how your repairs last. You can afford to use nothing but the best. For the motorist's own use Goodrich Accessories yield you a good substantial profit and sell easily.

Stock now—on Goodrich Accessories and Repair Material.

THE B. F. GOODRICH RUBBER COMPANY

The City of Goodrich :: :: Akron, Ohio

GOODRICH TIRE ACCESSORIES

Please mention the Automobile Dealer and Repairer when writing to advertisers.

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Livingston Radiators.

The Livingston Radiator Corp., 203 W. 75th Street, New York City, are introducing their "Bull Dog" combination radiator and Streamline hood for Ford cars. This



Bulldog Radiator and Hood for Ford Cars.

radiator is extremely efficient and is constructed according to the latest design.

The company claims that even though the cooling medium be frozen, the radiator will not be damaged. The combination hood and radiator as shown in the cut is extremely attractive in appearance, while the cost is extremely low. Our readers should write for catalog and descriptive matter.

A New Vice-President.

L. P. Prossen has resigned as Mechanical Superintendent of the Black & White Taxicab Company, New York City, and become associated with the Nilson-Miller Company of Hoboken, N. J. Mr. Prossen has been elected Vice-President and will be in charge of the Gear Cutting, Piston and Piston Ring Departments.

Red Star Timer for Fords.

Since war days have been here and we have all more or less been forced to drive our old cars longer and buy new parts for them oftener, the general tendency has been to buy better parts. Parts that will keep the old car running longer and give more wear.

The timer of Ford cars has always been more or less a source of trouble. In fact, this has developed to such proportions that the demand for a Timer that would really wear, has followed automatically, and this is the reason why the Red Star Timer for



Fords has gained quick favor with the Ford public.

In building this timer special attention has been given to the parts that wear out the quickest, namely the race and roller. The Red Star Timer race is made of the best quality bone-fibre. It is natural color and cured until it is very hard and durable. It is also made of one piece throughout and not built up in layers. Therefore, crumbling and coming apart are impossible.

The roller of the Red Star Timer is designed to roll under all conditions. The roller on a roller principle is applied giving virtually a roller bearing roller. This reduces wear to a minimum and tends to give extremely long life and lots of service.

Each Red Star timer is stamped with a Red Star right on the timer shell. This is quite an innovation in Ford timers and the company are featuring it in all of their advertising. It marks it as their own product and is a precautionary measure against substitution.

White Stripe Transmission Lining.

The service which transmission lining undergoes in the Ford car is very severe. It is subjected to scalding oil, burning friction, and great stresses in bringing the car to a stop. Under this kind of treatment it is no wonder that fabric should become hard and polished and then be unable to deliver efficient work.

To provide a better transmission lining, the engineers of the Advance Automobile Accessories Corporation, 56 East Randolph St., Chicago, have worked out a treatment and a method of administering it which results in increased efficiency and life. This treatment, it is claimed, per-



meates each thread of the fabric and protects it better from the scalding oil than anything else ever devised. The effect of this better protection is obvious.

The oil cannot penetrate the fabric, harden and cause it to become stiff and unresponsive to pressure. It stays soft, presenting a good braking surface to the drum of the car for a much longer period than ordinary lining.

White Stripe Lining is unique in that it is the first transmission lining for Ford cars which has been identified by a distinctive marking so that it can readily be identified whether it is sold to the Ford owner from the roll or in boxes.

Norman S. Hobson Becomes Field Representative for the Connecticut Telephone & Electric Co.

Upon his release from military service, Norman S. Hobson has associated himself with The Connecticut Telephone & Electric Company of Meriden, Connecticut, and will handle the sale of that Company's products in New England and upper New York State.

Carbon-X.

A truly "New and Interesting Thing in Motordom" has apparently made its appearance in the advent of Carbon-X, the Guaranteed Carbon Consumer, which is being introduced by "C-P" Chemical Company, 305-326 River Street, Chicago.

At the first glance, one might form the opinion that Carbon-X is just "another carbon remover," but reference to almost any dictionary will quickly show that "consuming" carbon is a vastly different operation from "removing" carbon. Hence it would seem that Carbon-X is in a class by itself, and is really something new.

It is claimed that Carbon-X consumes the deposited carbon, as fuel, thereby delivering all the power that gasoline contains to the crank-shaft. Since carbon deposits represent the un-consumed portion of the gasoline, it is reasonable to assume that if all the gasoline were "consumed" better mileage would be obtained than if only part of it was consumed and the balance "removed."

"C-P" Chemical Company has published a little booklet entitled "Why Is Carbon?" which discusses the carbon problem in a very interesting manner, and which will be sent to anyone on request. We suggest that our readers obtain a copy of this booklet and then try Carbon-X.

Black & Decker Add to Their Organization.

The Black & Decker Manufacturing Company, Baltimore, Md., makers of Portable Electric Drills and Electric Air Compressors, announce that Mr. D. G. Caywood, formerly Sales Manager of The Brunner Manufacturing Company, Utica, N. Y., has joined them in the capacity of Special Representative, to carry on the field work in the distribution of the Black and Decker specialized products. Mr. Caywood was among the first to see the wide possibilities of the Electric Air Compressor and has been actively engaged in this field for the last fifteen years.

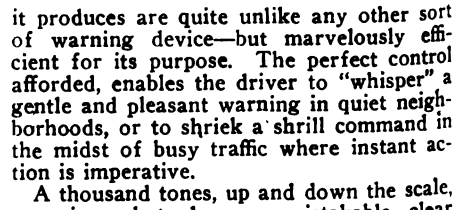
Mr. Graham W. Brogan, Advertising Manager of The Duesenberg Motors Corporation, will also join the Black & Decker organization on January 15th, to handle their publicity.

Both Mr. Caywood and Mr. Brogan will have their headquarters at the Baltimore factory of The Black & Decker Manufacturing Company.

The Victory Siren.

A distinctive and unique warning signal is the clever little device coming into wide favor just now under the name "Victory Siren." It attaches to the exhaust manifold of any car in a few minutes, is controlled from the dash or steering column, and sings "like a mocking bird."

The charming, musical warbles and trills



Victory Siren.

it produces are quite unlike any other sort of warning device—but marvelously efficient for its purpose. The perfect control afforded, enables the driver to "whisper" a gentle and pleasant warning in quiet neighborhoods, or to shriek a shrill command in the midst of busy traffic where instant action is imperative.

A thousand tones, up and down the scale, are given—but always unmistakable, clear and compelling. The device is sold through the jobbing trade and by practically all dealers. It is beautifully finished in polished brass, and is manufactured by the Inter-State Tool & Manufacturing Co., St. Louis, Mo.

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The New York Passenger Car Show Ends.

With sounding of horns and the cries from thousands of throats, the most successful passenger car show that has ever been staged in New York ended on Saturday, February 8.

The writer made a point of interviewing a large percentage of the exhibitors and without exception every one of them indorsed the present management, giving unqualified praise to the secretary, Charles A. Stewart.

And Mr. Stewart certainly deserves praise for his able management. The amount of business was enormous, the spirit of optimism pervaded the show at all times and courtesy was the keynote.

Because of manufacturing conditions, there were but few really new models of finished cars, in fact the Phianna, shown in the Armory, and the Essex, exhibited at the Garden, were the only two wholly new models on exhibit for the first time.

At the conclusion of the show, the passenger cars and accessories were removed and the space cleared for the truck show which opened on Monday, February the 10th.

NEWARK SHOW PAPER.

If Newark's automobile show is a failure, it won't be because of poor management, for they have shown that they are up to the minute by publishing a co-operative paper of suggestions which they are sending around to the trade. This four-page sheet is full of interesting information and gives a number of suggestions for displays and booths.

NOT ALWAYS APPROPRIATE.

"Sand," remarked the head salesman, "is the most necessary quality in an automobile salesman. It can be used in any business at any time, anywhere."

"Just a minute," interrupted the cub, "do you recommend its use in our cars on the clutch or in the gears?"



HOW TRUE!

We are indebted to Harper's Magazine for this wise anl truthful bit of humor:

The teacher had been telling her class about the rhinoceros family. "Now name some things," she said, "that are very dangerous to get near to, and that have horns?"

"Automobiles!" promptly answered Johnny.



FORTUNATE?

Brown (on fishing trip)—Boys, the boat is sinking! Is there anyone here who knows how to pray?

Jones (eagerly)—I do.

Brown—All right. You pray, and the rest of us will put on life belts. They're one shy.



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The General Cord Tire.

The General Cord Tire is of two-cure construction, expanded on a specially constructed air bag instead of the usual steel core.

Every cord is expanded equally to the fraction of an inch, and the tire is cured while the cords are thus stretched to the degree that inflation on the wheel would have stretched them.

Thus when the tire is inflated on the wheel, it is in the same condition that it was when cured. The rubber and fabric is *not* stretched, it gives naturally to road obstructions, the rubber doesn't cut, split, rim-cut or separate from the fabric as in



A General Cord Tire.

the case where inflation on the wheel puts the whole tire structure under tension.

It is claimed that 36x4½ General Cord is as large as the largest 37x5 fabric tire and in addition has eight plies of cords as against the seven plies of fabric in the 37x5 fabric tire.

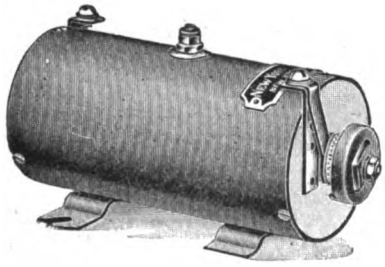
Yet the 36x4½ General Cord—as large a tire and with one more ply is said to cost 10% less than the 37x5 fabric tire, and gives "cord" comfort, class and economy in addition.

The General Cord Tire for passenger cars is made with both ribbed and nonskid treads, in sizes from 32x3½ up to 37x5.

New York Replacement Coils.

For the past several years, the New York Coil Company, 338 Pearl Street, New York City, have been manufacturing a complete line of Replacement Coils interchangeable with those supplied on all modern battery ignition equipped cars.

The above Company claim that these Coils produce a veritable flame at all engine speeds on the minimum amount of battery energy, and that they are guaranteed



A New York Replacement Coil.

to give perfect service even when the voltage is very low, insuring easy starting and thereby greatly increasing the life of the storage battery.

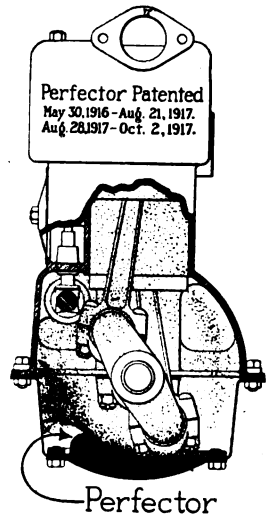
Hundreds of Dealers who are handling these Coils have found that it has added a most profitable addition to the business as by having a very small quantity of coils in stock, they are enabled to replace a defective coil and keep the car in operation without the delay of having to send to the factory for a new coil.

A circular describing the proper model coil for any make of car will be supplied to all interested dealers, together with prices which should prove exceedingly attractive.

Oiling System Perfector.

The Perfector Mfg. Co., Dept. E., Los Angeles, Cal., are putting on the market a little device which deserves the attention of our readers for the very reason that it tends to reduce carbon deposits in the Ford engine.

Every reader who has had experience with Ford cars, realizes that one of their principal troubles is excessive carbonization, particularly in cylinders one and two. This is partly due to the fact that the oil in the splash pans of cylinders one and two is deeper and when the connecting rods dip into it the splash is greater than in the other two cylinders.



The device called the Perfector is simply a cleverly designed baffle plate which is designed to fit in the Ford crank-case and prevent the direct splash of the oil from working into the cylinders. Better lubrication is secured because the Perfector tends to break up the oil into a fine spray. There is no chance for the direct splash to reach the cylinders.

The Perfector may be installed in a very few minutes. There are no holes to bore, no alterations to be made, since the device clamps between the hand hole plates and the crank case at the bottom of the engine.

Representative for the East.

The Corcoran Mfg. Co. of Cincinnati, Ohio, have decided to carry on a big selling campaign and have appointed Mr. J. W. Flannery to represent them in the East. Mr. Flannery is well known to the trade as a very capable man.

The Ambu Armature Tester.

No more guesswork when called upon to diagnose and locate trouble in a dynamo or motor that is not delivering its full rated capacity. With the Ambu Armature Tester any electrician can very quickly locate any short circuit, open circuit, ground or reversed connection in any faulty armature if it is equipped with a commutator.

Regardless of the size of the armature, one man alone, can handle all the tests with this device and locate exactly the trouble and tell what the fault is. As the Ambu Tester weighs but 7 pounds, complete, it can easily be carried and used anywhere. With all its accuracy and dependability it needs neither voltmeters or ammeters for the indications are all by sound and not by dials and pointers. This sturdiness and absence of finely adjusted mechanism commends it to every electric mechanic.

One great feature of the Ambu Armature Tester is that it will operate on any A. C. or D. C. circuit from 6 to 220 volts, and it takes less than one ampere of current from any line on which it is connected. The Ambu Tester can be used on a storage battery or even on a hand generator current.

The Ambu Armature Tester consists, as shown by the illustration of three parts, connected by duplex insulated wire: a resistance and condenser box, containing a current interrupter; a telephone receiver with head clamp; and the Tester Head. As an auxiliary in testing for grounds, is supplied a ground plate and wire.

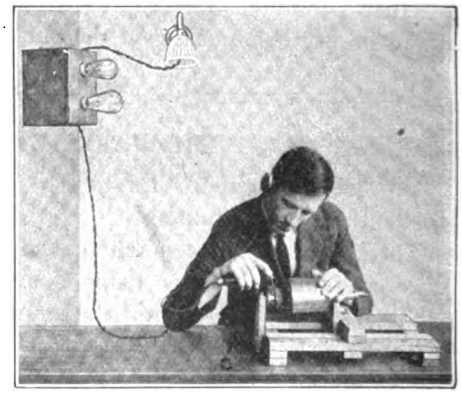
This Tester Head is composed of a handle containing a transformer coil the secondary of which is connected to two curved arms that are held in position by springs. Between these two arms, in the end of the tester head are two contact-making pins to bridge the consecutive segments of the armature when testing. These are connected to the primary winding of the coil.

In operation the Ambu Armature Tester is simple as its construction. The condenser box is connected by means of the plug, to the line circuit and the proper lamp resistance put in place; the telephone receiver is clamped to the ear and you are ready for the test.

The armature need not be taken from its place if it is possible to swing the brushes back away from the commutator far enough to permit easy working. However, with small armatures it is advisable to take them out and put them on a stand for the testing is easier and, if trouble is found, they have to come out anyway.

The Tester Head is grasped firmly in either hand and pressed down on the commutator, spreading the spring arms, until the contact points are resting on two adjacent segments. Instantly there is a humming tone in the telephone receiver at the ear. The tester head is lifted out of contact and moved to the next two segments and again the tone is given.

When the circuit is all right there is a smooth even hum; if an open circuit then there is a sudden very marked increase in the loudness of the tone. A short circuit in the armature is marked by an equally marked decrease in the tone.



The Ambu Armature Tester In Use.

If the connections on any segment are reversed, after a repair job, then every second pair of segments returns the loud tones of an open circuit.

If these tests are made and no change in tone are noted then the trouble must be a ground. To test for this place the ground plate of the tester in contact with the armature shaft and then use but one contact pin on the commutator. When the current is

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Used Exclusively by

Pierce-Arrow
Winton
Mercer
Stutz
Simplex
White
Stegeman
Kelly-Springfield
Wright-Martin
Thomas Morse
Aeromarine

HEROES are born, but calamity discovers them. Articles of merit are made, but it is their users that proclaim them.

Without much ado in advertising, American Hammered Piston Rings have forged to the front —*on merit.*

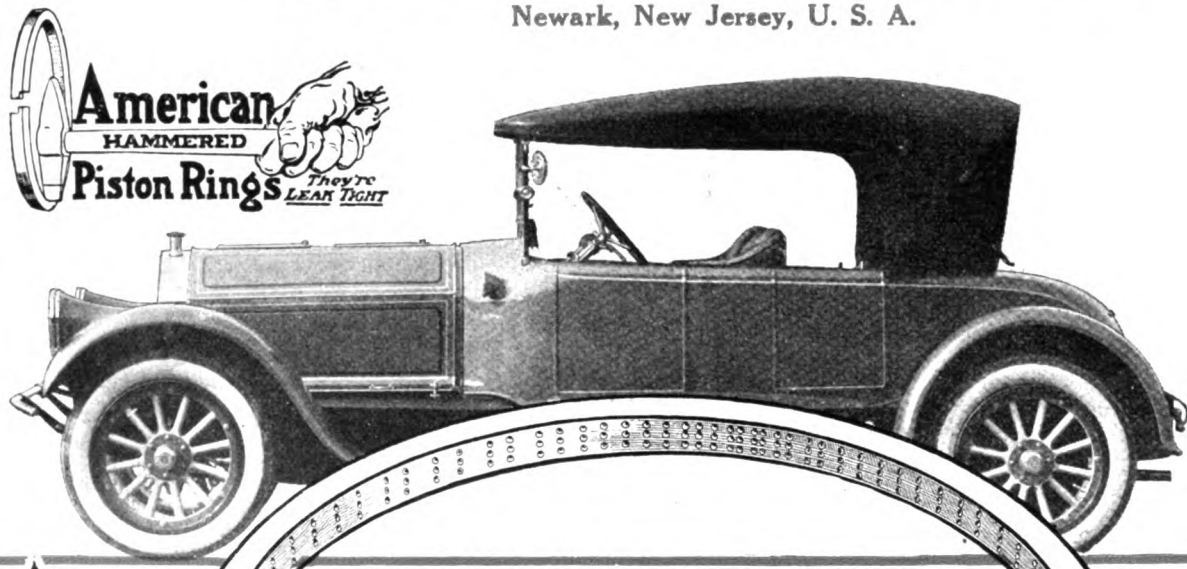
When Uncle Sam went to war, he took with him motors for truck, tank, aeroplane and tractor equipped with American Hammered Piston Rings—*for a reason.*

In designing the motor that was destined to win new laurels for the already famous Pierce-Arrow car, and increase its power, stamina and efficiency, its builders chose American Hammered Piston Rings to achieve that result.

And so, one by one, the foremost automotive engineers have come to recognize in American Hammered Piston Rings the *ultimate* in piston ring efficiency.

We have an attractive dealer proposition. Write for it.

THE HAMMERED PISTON RING CO. *of* AMERICA
Newark, New Jersey, U. S. A.



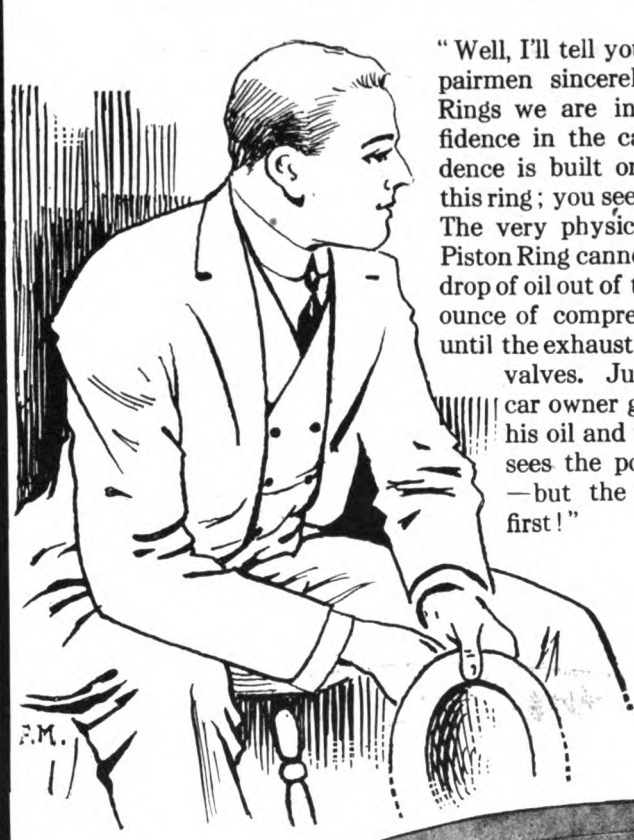
AMERICAN *Hammered*
Piston Rings
THE QUALITY IS HAMMERED IN

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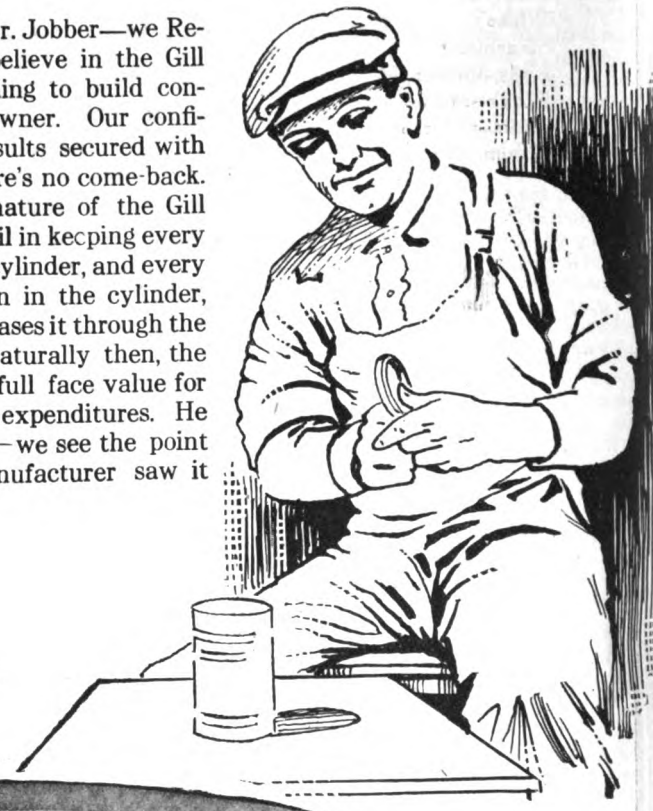
HOW DO YOU ACCOUNT FOR IT?

"Mr. Repairman, how do you account for the immense popularity of

GILL PISTON RINGS"



"Well, I'll tell you, Mr. Jobber—we Repairmen sincerely believe in the Gill Rings we are installing to build confidence in the car owner. Our confidence is built on results secured with this ring; you see there's no come-back. The very physical nature of the Gill Piston Ring cannot fail in keeping every drop of oil out of the cylinder, and every ounce of compression in the cylinder, until the exhaust releases it through the valves. Just naturally then, the car owner gets full face value for his oil and fuel expenditures. He sees the point—we see the point—but the manufacturer saw it first!"





Gill Piston Rings Are Self-Fitting, One-Piece Rings of Very Careful and Sturdy Construction

FOR EASY SALES—THAT STAY SOLD—GILL PISTON RINGS BREAK ALL RECORDS

Their Prestige Makes Argument Unnecessary. Ask Your Jobber—He Knows.

GILL MANUFACTURING CO., 351 W. 59th Street, CHICAGO, ILL.

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Advance

Automobile Accessories Corporation

Announces Another Big Money Maker

"Next Best to Cork Insert"

Here is important news to every jobber, dealer and Ford owner. A far better transmission fabric for use in Ford cars has been produced. After months of research and experiment the Advance chemists have made a great discovery. They have developed a chemical treatment which makes transmission fabric resist the scalding hot oil. IT STAYS SOFT AND KEEPS ITS BRAKING EFFICIENCY. They also have perfected the method of applying the new treatment so that it penetrates every tightly-woven fibre.

White Stripe TRANSMISSION LINING for FORD CARS

Means More Money to the Trade on Ford Lining Sales

It will change more of your business on Ford lining from the no-name kind to the trade-marked kind. It will mean more money to you and better value and satisfaction to the consuming trade. Being sold both in boxes and from the roll, it answers every need of dealer and consumer.

Jobbers will want to catalog White Stripe Lining. Attractive electros have been prepared and are awaiting your request.

White Stripe is bound to prove another big money maker for the trade. First—because it is the best transmission fabric for use in the Ford car ever produced. Second—because every foot of the lining is marked by the distinctive white stripe for ready identification.



In Boxes
$2 per set of 3
Rockies west, $2.25
Canada $3

In Rolls 32 cents per foot
Rockies West, 35c Canada, 40c

Send Coupon for Set of White Stripe Lining

White Stripe fills a real need. It supplies the trade with another popular and fast selling accessory. It supplies the Ford owner with lining for the car that will stay soft and hold its good working qualities longer than any other plain fabric.

ADVANCE AUTOMOBILE ACCESSORIES CORP.
Dept. B5, 56 East Randolph St., Chicago

For Ford Owners

Enclosed is $..... for set of three White Stripe Transmission Linings for Fords.

Name.....

Address .....

City..... State.....

For Dealers

Send sample set of Advance White Stripe Transmission Lining through following jobber.

.....

Name.....

Address .....

City..... State.....

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sent through the segment which is nearest the ground the tone will be very dim.

Thus in every kind of trouble, open circuit, short circuit, ground or reversed connections the Ambu Tester will pick out the segments or pair of segments nearest to the fault. And it is all done by sound.

The American Bureau of Engineering, 1025 S. Wabash Avenue, Chicago, the patentees and makers of this remarkably simple but efficient device tell us that it has been in daily use for nearly three years undergoing the most severe tests and trials to prove in every way its absolute infallability.

As any electrician can, with a little practice and experience test any armature, regardless of size, in a very short time, it is more than probable that the demand for this Ambu Armature Tester will reach huge proportions for it is a wonderful time and labor saver. We suggest that you write to the company for further data.

New Distribution Plan for Pyrene.

A new plan of distribution involving a liberal attitude toward both the jobber and the dealer has been adopted by the Pyrene Manufacturing Company of New York. This plan was put into effect shortly after the appointment of Mr. Walter Bauer as president.

Industrial and dealer business heretofore handled by the Company direct has been turned over to the jobber entirely eliminating all competition between the company and its distributors. Pyrene salesmen will work with distributors' salesmen in developing business.

The Company has offices in Atlanta, Cleveland, Chicago, Kansas City, New York and San Francisco.

New Advertising Department Head.

Mr. G. P. Blackiston, formerly the advertising manager of the Packard Electric Co., the Central Steel Co. and the La Belle Iron Works, has accepted a position with the American Rubber & Tire Co., of Akron, Ohio, as head of their co-operative and advertising department.

The trade will recall that Mr. Blackiston has been an enthusiastic automobile man ever since the advent of that machine, and his experience begins with the time when he drove a single cylinder Cadillac in the early days of the industry.

Automatic Safety Switch.

The Apco Mfg. Company of Providence, for many years recognized as leaders in the Ford equipment field, have made their debut in the tractor business with a new automatic Safety Switch, which is designed to prevent the Fordson tractor front end rising off the ground. Several serious accidents, some of them resulting fatally have been caused by this happening, according to items appearing in the trade papers.

The Apco Switch operates on the gravity system, when the tractor wheels rise to a predetermined height the Switch shuts off the power and permits the wheels to come to earth again. The Fordson manual warns operators against this trouble, but the Apco Switch absolutely prevents it. The device is well made of the best materials and can be put on the machine in five minutes without machine work, simply loosen two crank case bolts, put Switch in place, connect wires and job is done. The manufacturer guarantees the device in every way. Dealers and Jobbers are requested to write for discounts. Every Fordson owner will buy it as life insurance.

Battery Separators.

We want to call the attention of our readers to the fact that the Ferry-Mark Mfg. Co., 2117-25 S. 4th Street, St. Louis, Mo., are putting on the market a big line of battery plate separators.

These separators are made from the best of materials, chemically treated, and guaranteed to be scientifically correct. Anyone who is familiar with storage batteries, realizes that new separators must be used in every case where a battery is overhauled.

It is true that the old separators may answer the purpose in some cases. Still, their use is poor economy. At the same time, the battery repairman can ruin the battery by placing a poor grade of separators in it. We should advise our subscribers to investigate the Ferry-Mark line.

Waxit Cleaner and Polish Backed By Efficient Advertising.

The Waxit Mfg. Co. is starting a vigorous advertising campaign to further stimulate the demand on Waxit. Waxit, as the advertisements state, is both cleaner and polish. Its function is first to take off the dirt, grease and dust, and restore the brilliancy of finish which it formerly possessed. Both of these results are accomplished in the same operation. No oily film or waxed surface is produced. The original lustre is brought back.



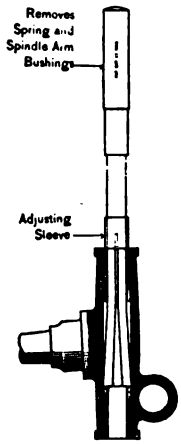
The various advertisements in the present campaign depict scenes that are familiar to every car owner. For instance, a man is shown looking at his car with an air of despair for he has invited friends to take a ride, and the car is looking the worse for travel. However, the little Waxit girl arrives at the psychological moment with a bottle of Waxit and saves the day. In addition to its journal advertising, the Waxit Company provides their dealers with attractive cut outs and counter displays.

The display pictured is provided free of charge, with the first order of merchandise, and it has been amply demonstrated that it helps materially to move the goods. Waxit is sold in 6 oz., 14 oz. and quart bottles, and half gallon and gallon cans. Dealers are invited to write Waxit Mfg. Co., Old Colony Bldg., Chicago, mentioning this paper, for the attractive dealers' proposition.

Mosco Bushing Remover.

The attention of our readers is called to the unique and interesting device known as the "Mosco" Jiffy Bushing Remover, and sold by the Motor Specialties Co., Waltham, Mass. This device is fitted with an adjustable sleeve and is split about half of its length.

The sections at the sides of the split are resilient and expand except when held together by the sleeve. It may be used for driving out bushings from practically any housing where ½" shafts or bolts are used, but it is designed particularly for driving out spindle bushings on Ford, Chevrolet, Saxon and Dodge and other cars.



Mosco Jiffy Bushing Remover.

Barrett Motor Starter.

Something new in the way of mechanical engine starters is now ready for the market, manufactured by the Barrett Motor Starter Mfg. Co., 1777 Broadway, New York City. For a number of years E. D. Barrett has given his best thoughts to the perfection of this starter and has tried to put out a device which not only is cheap, but reliable in action.

The Barrett starter is said to be built of the very best of material, mechanically correct in design, and so arranged that nothing short of a general smashup of the car and the engine, could end its usefulness.

It operates through a lever at the left side of the car beneath the hood. This lever is connected by means of a rod to a movable handle and is operated by the left hand of the driver. The gears used in the device are made of case hardened chrome nickel steel and are said to be good for the life of the engine.

A self oiling appliance insures lubrication for at least 5000 miles. The device is "back-fire proof" so to speak. In case of a kick-back a gear is automatically released and the crankshaft turns freely without reacting upon the starter. Our readers are advised to write for literature.

Dyke's Automobile Encyclopedia.

As will be seen by reference to the advertisement on another page, the ninth edition of Dyke's Automobile Encyclopedia is announced to have 940 pages and the cost of this new edition will be, postage or expressage prepaid to any part of the United States or Canada, $4.46 This Encyclopedia is a standard work. It covers the whole ground thoroughly and is having a big sale everywhere. Our readers who want to keep thoroughly posted should send to us for a copy at once.

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A Step Forward.

The Ahlberg Bearing Company of Chicago, one of the best known ball bearing concerns in the country, are taking another long step forward in their rapid advancement since starting in business ten years ago. Their plant which is now located at 2636 Michigan Ave., has for a long time been inadequate for the amount of business they have received but they were unable to erect their proposed new plant due to the fact that the government placed a ban on buildings during the period of the war.

This ban has now been lifted, however, and immediate steps have been taken to erect their new factory and ground has already been broken and from all indications same will be ready for occupancy the latter part of February. This is the first factory of its kind to be erected for the remaking or repairing of old worn out ball bearings.

The new location will be at Twenty-ninth St. and Calumet Ave., which is right in the heart of the Auto district of that city.

The new building will be two stories high and constructed of steel and reinforced concrete, having a floor space of about 20,000 square feet. It is so designed with reference to lighting that every inch of floor space will be available for the handling of the remaking process.

A remade ball bearing up to until about ten years ago was unheard of. The Ahlberg patented grinding device has made possible the salvaging of old worn out ball bearings. This plan immediately became popular as it enabled the ball bearing user to secure remade bearings, which are equal to new in every respect, immediately at a considerable saving.

The demands for their service grew in leaps and bounds. Out-of-town trade became such that it was impossible to handle it from their Chicago plant and immediately branch offices were established carrying a complete stock of bearings in all the large cities throughout the United States with the result that all out-of-town customers are now able to receive twenty-four hour service on practically any ball bearing desired.

Travis Joins Owen Tire Forces

Announcement is made to the motor fraternity that O. L. Travis has been appointed sales manager of the Owen Tire and Rubber Company of Bedford, Ohio, manufacturers of Owen Truck Tires.

Mr. Travis has an unusually wide acquaintance among motorists and dealers throughout the United States because of his extensive travels. He brings to the Owen organization a broad experience in all branches of sales, advertising and merchandising. As an example of Mr. Travis' previous experience with tire manufacturers sales under his directions, and largely due to his personal efforts, have shown marked and decided increases over former output.

Mr. Travis has an extensive knowledge of truck tires, haulage and other conditions affecting the service they give. Going even further, to the advantage of Owen Truck Tire users, he has surrounded himself with men who will co-operate with operators of trucks to the extent of suggesting, not merely an Owen tire but the *right* Owen tire for the particular conditions under which they are to operate.

"Successful selling depends largely upon two things—product and service," says Mr. Travis. "Owen tires are good sellers because of Owen quality—and as for service, well, Owen Service begins before the tire is bought. We help you select the proper tire."

W. J. Johnston Now Field Sales Manager for the Connecticut Telephone & Electric Company.

W. J. Johnston, who for the past seven years has looked after the interests of the Connecticut Telephone & Electric Company with the automobile manufacturers, has been promoted to the rank of Field Sales Manager.

Johnston's experience with the above company began in the days when the Connecticut Telephone & Electric Company was famous for the excellence of the vibrating type coil systems it produced. It was carried through days of the magneto, and has covered every phase of the sales development of the modern Connecticut Automatic Ignition System: the introduction of this system, the conduct of engineering tests, and the handling of the immense amount of detail connected with stepping the sales of Connecticut Automatic Ignition from a modest beginning to the premiere position in the automotive field.

Such an experience could give Mr. Johnston nothing other than an intimate knowledge of his subject, and this, combined with one of the most pleasant personalities a man was ever blessed with, has won for him the good will of practically every man in the industry and endows him with their hearty good wishes in his new assignment.

Hodgkins Is General Sales Manager.

At the recent annual stockholders' meeting of The Cleveland Tractor Company, R. T. Hodgkins, General Sales Manager, was elected a director, and at the meeting of the directors he was elected a vice-president.

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Classified Advertisements

Under this head will be printed advertisements of **Second Hand Cars Wanted or for Sale, Accessories of any kind Wanted or for Sale, Shops for Sale or Rent, Situations or Help Wanted, Second Hand Tools or Machines for Sale or to Exchange,** at the uniform price of **five cents a word,** including the name and address, for each insertion, payable in advance. **No advertisement will be inserted for less than 75 cents, however small.** Remittances may be made in postage stamps or in any convenient way.

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GUARANTEED

Write for Catalogue

M. LIBEN & CO.

205-A West 48th St. New York City

Exceptional Values IN DOUBLE CHAIN STITCHED TIRES

Size	Plain	Non-Skid	Size	Plain	Non-Skid
28x3	$4 50	$5.00	35x4	$10.00	$11.00
30x3	5.50	6.00	36x4	10.00	11.00
30x3½	6.50	7.75	34x4½	11.00	12.00
32x3½	8.00	9.00	35x4½	11.00	12.00
31x4	9.00	10.00	36x4½	11.00	12.00
32x4	9.00	10.00	37x4½	11.00	12.00
33x4	9.00	10.00	35x5	11.00	12.00
34x4	10.00	11.00	36x5	12.00	13.00
			37x5	12.00	13.00

Have your own tires Double Treaded by the same process. Our charges are only 40% off the above mentioned prices.

Send your order to our nearest office.

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Double Tread Tires with Double Lock Stitch

30x3	N. S.	$5.50	34x4½	N. S.	$8.50
30x3½	"	6.50	35x4	"	9.00
32x3½	"	7.00	36x4	"	9.50
31x4	"	7.25	36x4½	"	10.00
32x4	"	7.25	36x5	"	10.00
33x4	"	7.50	37x4½	"	10.00
34x4	"	8.00	37x5	"	10.00

We carry a full line of Firsts and Factory Blemished Tires and Tubes at moderate prices.

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Tires

BUY EARLY AND SAVE MONEY

Double Tread Tires and Tubes

GUARANTEED

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SO ARE OUR TIRES.

Size	Plain	Non-Skid	Tubes
28x3	$4.40	$4.95	$2.00
30x3	5.50	6.05	2.00
30x3½	6.60	7.15	2.65
32x3½	7.15	7.70	3.00
34x3½	8.25	8.80	3.00
32x4	9.50	10.50	2.75
33x4	9.50	10.50	3.25
34x4	9.80	10.80	3.50
35x4	9.90	11.00	3.50

Get your order in quick for goods listed here—by all means get in touch with us for further information about our special process—it means money in your pocket. Get in right—write to-day—yes—to-day.

Look up rating in Dun's or Bradstreet's.

Size	Plain	Non-Skid	Tubes
36x4	$9.90	$11.00	$3.60
32x4½	9.90	11.00	3.60
34x4½	11.00	12.10	4.00
35x4½	11.00	12.10	4.10
36x4½	11.00	12.10	4.25
37x4½	12.10	13.20	4.35
34x5	11.00	12.10	4.50
35x5	13.20	14.30	5.00
36x5	13.20	14.30	5.00
37x5	13.75	14.85	5.00

For rebuilding your old tires we charge you 60% of the above prices.

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WINTER BARGAINS IN SLIGHTLY USED, FACTORY REPAIRED

TIRES TIRES TIRES TIRES

New "Second" INNER TUBES at a 60% saving

A satisfied customer is our biggest asset, therefore we must satisfy you

Size	Used Tire.	New Tube.	Size	Used Tire.	New Tube.	Size	Used Tire.	New Tube.
30x3	$4.00	$1.95	32x4	$7.00	$3.05	35x4½	$8.50	$4.25
30x3½	5.00	2.30	33x4	7.75	3.25	36x4½	8.75	4.40
31x3½	5.25	2.40	34x4	7.75	3.40	37x4½	9.25	4.50
32x3½	5.50	2.40	35x4	8.00	3.50	35x5	9.50	4.60
34x3½	6.00	2.60	36x4	8.00	3.65	36x5	9.50	4.70
31x4	6.25	3.00	34x4½	8.25	4.15	37x5	10.00	4.75

Send $1.00 deposit with each tire ordered. Tires will be sent promptly, with privilege of examination, and balance C. O. D. Specify style of rim to avoid delay.

Our Used Tires are not guaranteed for any definite number of miles, but we will make reasonable adjustments on all tires that do not give service in proportion to the price paid, providing tires are returned to us by prepaid express. Is not this fair enough?

We carry a complete stock of New Tires. ***Write for Prices, stating size desired.***

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Patent Attorneys

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PATENTS—Don't lose your rights. Send for blank form "Evidence of Conception" to be signed and witnessed. Establish your rights in the start. Form and information concerning patents free. Lancaster and Allwine, 212 Ouray Bldg., Washington, D. C.

PATENTS SECURED—C. L. Parker, Patent attorney, McGill Building, Washington, D. C. Inventor's Handbook upon request.

RALPH N. FLINT, M. E.—Attorney-at-law in Patent Causes, late Assistant Examiner Internal Combustion Engine Division, U. S. Patent Office. Specialist in Internal Combustion Engine Cases. 2 Rector Street, New York, N. Y.

Auto Accessories

Westchester Accessories Co., Inc.
1777 BROADWAY, NEW YORK CITY

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Will quote prices on Standard Accessories upon receipt of inquiry.

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Woven Brake Lining
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CLEVELAND IGNITION CO.
1845-47 Euclid Ave., CLEVELAND, OHIO

VULCANIZING USED AUTO TIRES is a growing and profitable business, especially now. Easy to learn. Instruction book $1. Plants, $50 and up. Catalog free. Equipment Co., 304 8th St., Cincinnati, O.

LEAKY RUBBER JAR TESTER—A device that locates any small leak in Storage Battery Jars. A necessity for every Battery Station. Complete $6.25. Hallock Auto Accessories Co., Hallock, Minn.

Gears and Parts

STODDARD DAYTON PARTS
PAIGE-DETROIT & REGAL
KING D - ROSS 8—ABBOTT-DETROIT
GRANT—CROW-ELKHART—PULLMAN
New Rear Axle Bevel Gears & Pinions
BROWN-LIPE TRANSMISSION GEARS
THE DAYTON AUTO PART CO.
1777 BROADWAY, NEW YORK CITY

SAVE 50% TO 75% ON PARTS—Parts for Pope-Hartford, Columbia, Reo, Buick, Overland, Chalmers, Mitchell, Thomas, Oldsmobile, Maxwell, Stoddard-Dayton, Stevens-Duryea, Corbin, Cadillac and all others. Eiseman, Splitdorf and Remy magnetos, $5.00 to $10.00. Bosch high tension magnetos, $15.00 to $25.00. Also the Mea, Connecticut National, U. & H. and K. & W. magnetos in stock. Springs, wheels, axles, etc., for all cars. Connecticut Auto Parts Co., Inc., 1070 Main St., Hartford, Conn.

REPAIR GEARS, Axles, Wheels, Motor Parts, Bodies, Springs, Magnetos, Tops, Coils, etc., for all cars. Vim, Hudson, Mitchell, Buick, Overland, Stoddard, Dayton, Haynes, Studebaker, Marion, etc., etc. We can furnish anything at short notice. Address Atlantic Supply Co., Long Branch, N. J.

Rectifiers

RECTIFIERS to charge from A-C circuit 1 to 8 ignition lighting or starting batteries at one time, $12.00 upward. American Battery Co., 1136 Fulton St., Chicago, Ill.

Piston Rings

CYLINDER GRINDING

PISTONS and RINGS

✦ ✦

LARGEST Because BEST

✦ ✦

In our new plant, added facilities enable us to give better service than ever.

Houpert Machine Co.
Harris Ave. & Marion St., L. I. C., N. Y.
'Phone, Hunterspoint 916.

New Features Added to Stanweld Rims.

The new interchangeable features recently adopted by recognized manufacturers together with all the pronounced characteristics of Stanweld rim construction are embodied in the standardized demountable rim just placed on the market by the Standard Parts Company of Cleveland.

Stanweld rims have long been known for their ease of manipulation, lightness in weight, great strength, uniformity and smoothness of finish, and unique locking device.

The locking device is an exclusive feature of Stanweld rims. Though easy to operate, it is most secure. Such care is taken in the mechanical construction that all dangers from rough surfaces at the point of contact are eliminated, thus reducing the possibilities of tire wear.

Separated from the locking parts is the driving stud which is interchangeable on all standardized rims.

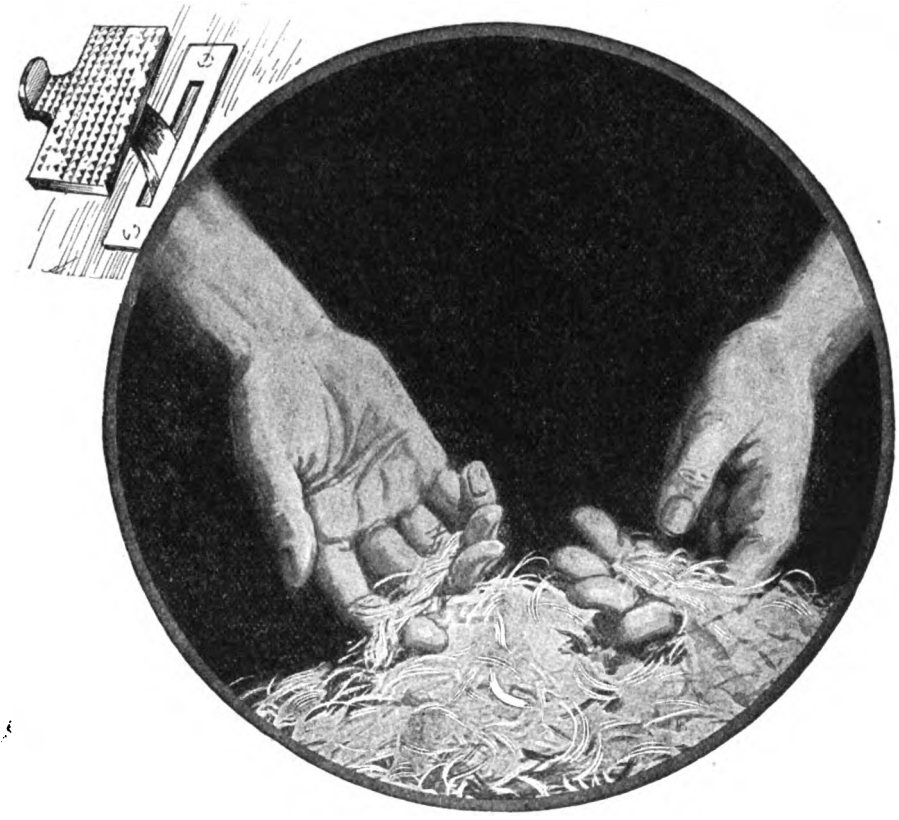
The split or opening of the rim is safely removed from the point at which the tire valve stem penetrates the rim. This in itself is a dominating feature. With the opening thus removed, danger of the valve stem threads being damaged as the rim is operated, is eliminated.

An additional advantage to be found in Stanweld rims is the efficiently designed rim wedge. With the Stanweld wedge an even and secure alignment of the rim upon the wheel is certain, a fact of great importance in saving tires from unnecessary wear. The extra large bearing surface of the wedge minimizes squeaking.

Still another distinctive feature is the permanent attachment of the wedge nut within the wedge itself. This permits of more rapid removal or application of the rim and obviates the possibility of the wedge nuts being misplaced or lost.

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TONS OF ASBESTOS ARE SORTED TO GET



All brake linings look alike perhaps —but the asbestos in them varies

When you tell a customer "Tons are sorted to get pounds for Non-Burn," he wants to know why.

It's easy to explain that some asbestos is of higher quality than the general run. And that Non-Burn is not only made of the best grade, but is literally "hand-picked" from the finest of asbestos fibre that the world's greatest mines afford.

Your customer will then realize the superiority of Non-Burn. And you will find it the easiest brake lining to sell—because it has this exclusive talking point.

JOHNS-MANVILLE SERVICE COVERS THE CONTINENT

And also through—

Asbestos

and its allied products

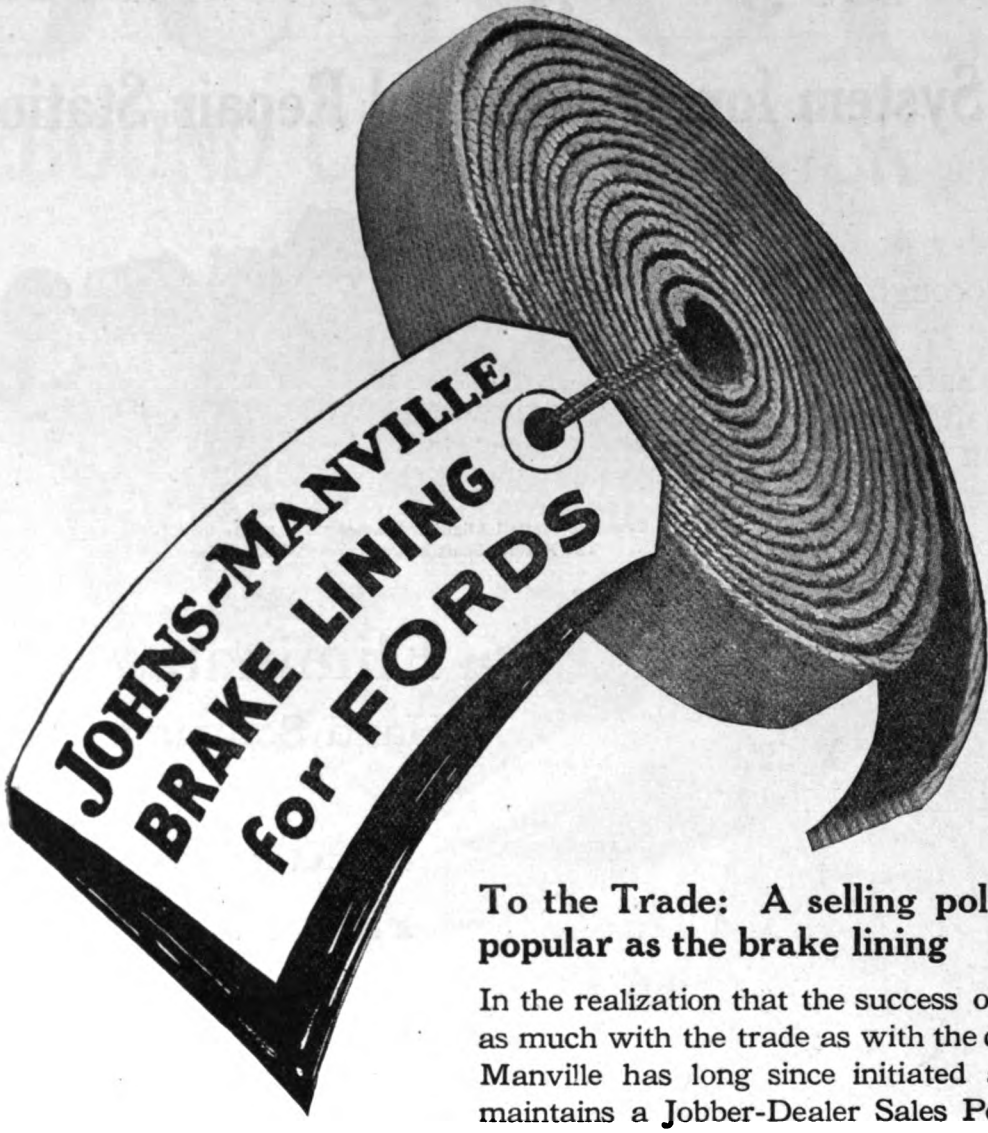
JOHNS-MANVILLE Serves in Conservation

Heat Insulations, High Temperature Cements, Asbestos Roofings, Packings, Brake Linings, Fire Prevention Products

AUTOMOTIVE EQUIPMENT **JOHNS**

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POUNDS OF JOHNS-MANVILLE NON-BURN



To the Trade: A selling policy that is as popular as the brake lining

In the realization that the success of Non-Burn lies as much with the trade as with the consumer, Johns-Manville has long since initiated and still rigidly maintains a Jobber-Dealer Sales Policy, that is fair to all who handle Non-Burn or any other Johns-Manville automotive equipment.

Distributing to dealers only through legitimate jobbers is a co-operative insurance that benefits jobber, dealer and consumer. It has been our aim, not only to make the best lining but to market the best lining by the best method. Anyone using Non-Burn will admit the success of the former, and anyone handling Non-Burn will concede the latter.

To the Trade: Non-Burn is sold only through legitimate trade channels. This protects you against indiscriminate competition and assures you a satisfactory profit.

H. W. JOHNS-MANVILLE CO.
New York City
10 Factories — Branches in 63 Large Cities

—MANVILLE

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Main Bearing Aligning Reamers

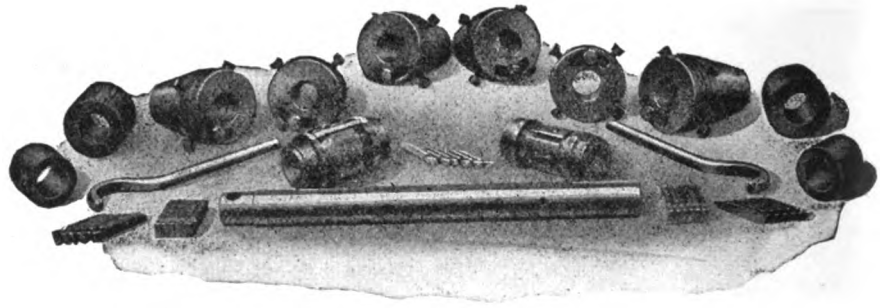
The Martell System for Garage and Repair Stations

Insures—

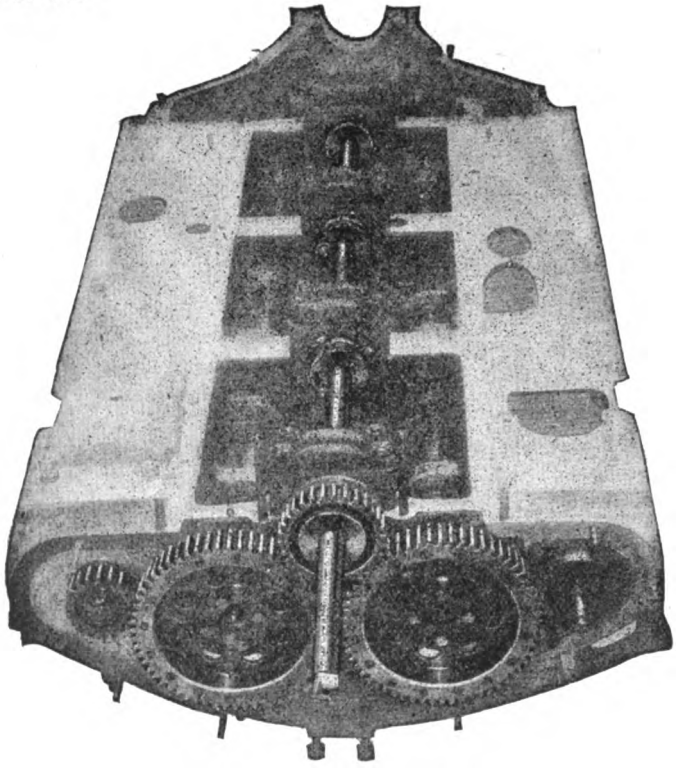
Perfect alignment through all bearings—

Correct position of shaft in relation to other shafts or parts depending upon it for motion—

Correct size of bore of bearings allowing for oil clearance.



A Complete Martell Aligning Reamer No. 2 Ready for Shipment. The Reamer Shaft is not shown but is furnished.



A Martell Aligning Reamer, Showing the Crank Shaft Gear Mounted on a Special Bushing on the Reamer Bar to Secure Proper Gear Mesh.

Eliminates

Hand Scraping.

Reduces

Fitting 90%

Equipment No. 2

provides a range in diameters from 1⅝ in. to 2½ in. inclusive.

A special equipment with rebabbitting fixture for Ford repair work.

Write for Descriptive Booklet 101-H and Price List

TAFT-PEIRCE

Woonsocket, R.I., U.S.A.

2057

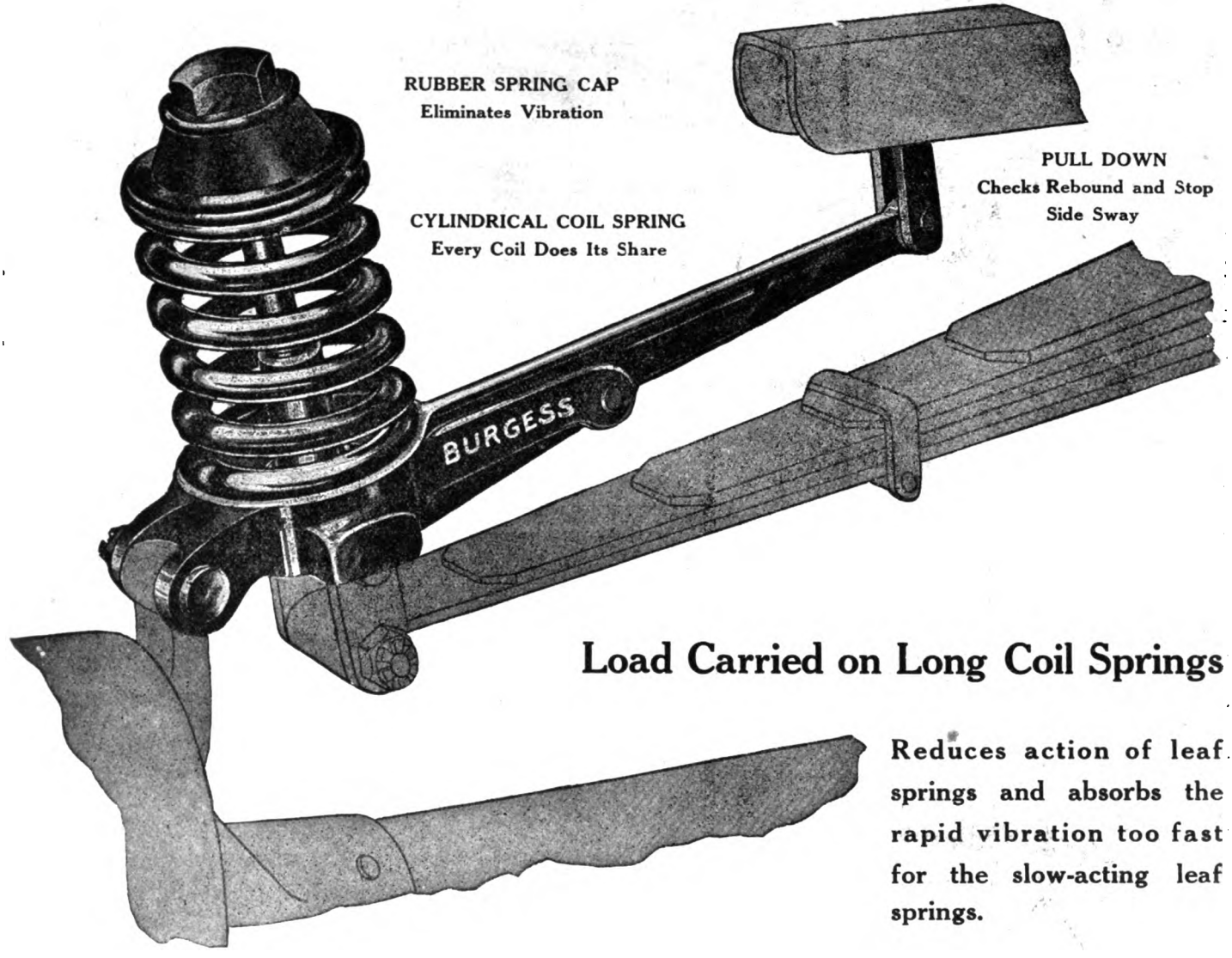
New York: Woolworth Building **Detroit: Majestic Building**

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BURGESS

REBOUND CHECK & SHOCK ABSORBER



Load Carried on Long Coil Springs

Reduces action of leaf springs and absorbs the rapid vibration too fast for the slow-acting leaf springs.

Does everything that all other Shock Absorbers are claimed to do, and many desirable things that none of them do.

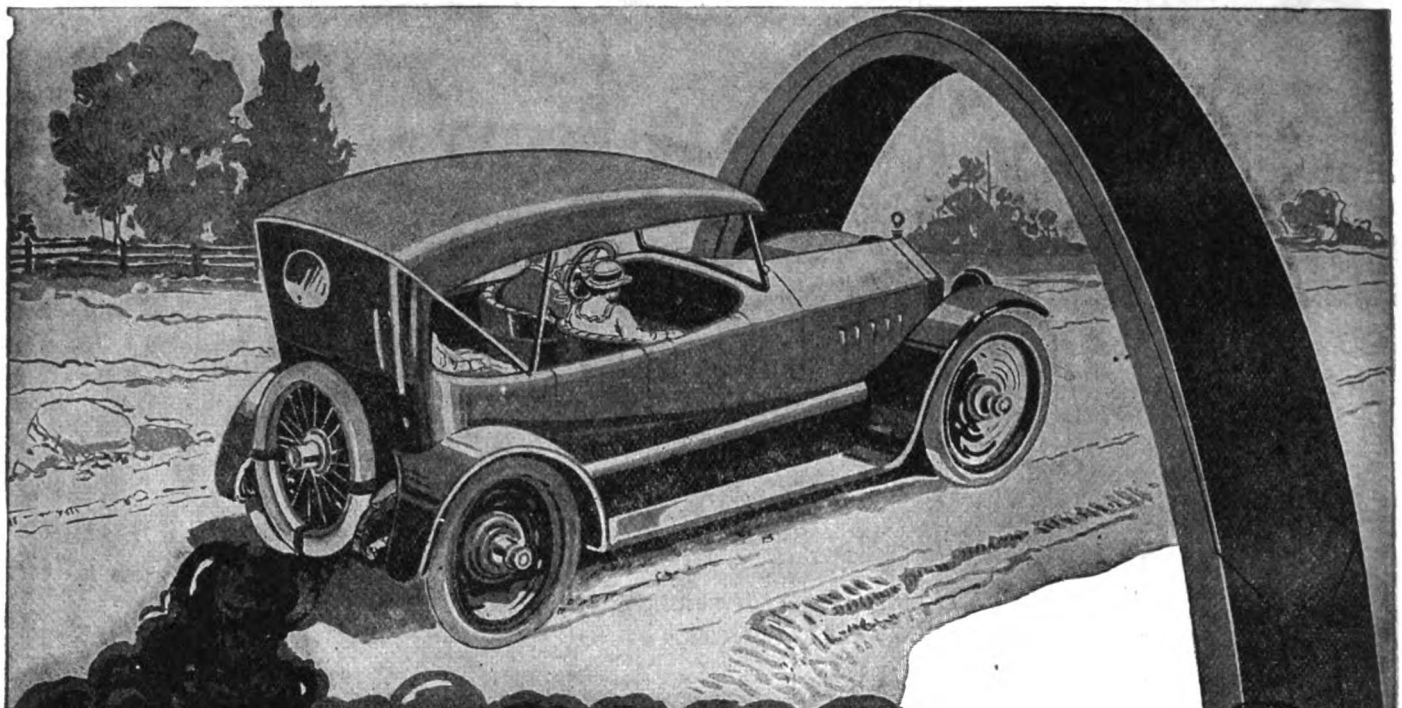
DEALERS, WRITE FOR DETAILS

Manufactured By

THE WALTER S. BURGESS MANUFACTURING COMPANY

SALES DEPARTMENT: THE ZINKE COMPANY, 1325 SOUTH MICHIGAN AVE., CHICAGO, ILL.

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A SURE SIGN of carbon is a smoky exhaust, due to lubrication getting *past* the piston rings up into the combustion chambers where it *burns*. Leaky piston rings waste as high as 25% gasoline —one drop in four.

HI-COMP PISTON RING

THE RING THAT MAKES THE MOTOR SING

are the best gas-tight rings for overcoming engine troubles due to carbon—knocking, skipping, faulty ignition; valve pitting, wearing down of cylinder walls, piston and piston rings; smoky exhausts.

Hi-Comp Piston Rings are made from two perfectly balanced perfect eccentric rings into one absolutely gas-tight concentric ring. Each ring ground under oil — not buffetted — to preserve the true temper of the secret process gray iron and ensure high polish and gas-tight fit. Won't wear cylinders out of round — *proof* of gas-tightness. Make reboring of average cylinders unnecessary — an exclusive Hi-Comp advantage. Hi-Comp Piston Rings deliver every ounce of power from every drop of gasoline on to the piston head — no power or oil can get past them!

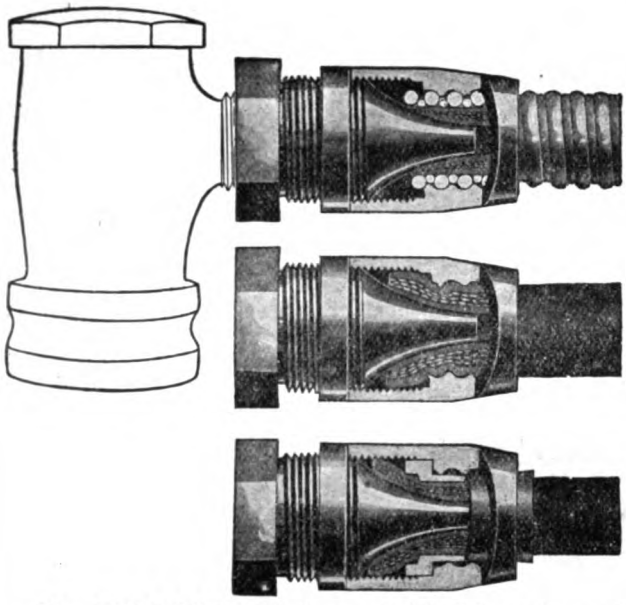
It will pay you to install Hi-Comp because of the satisfaction they give to you and your customers. Fully guaranteed by an old established piston ring company to give MORE POWER on less gasoline and oil. Write for booklet, specification chart and details of 90-day trial guarantee

The Continental Piston Ring Co., Memphis, Tenn.

The Ring that Makes the Motor Sing

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ROMORT
AIR HOSE UNIVERSAL COUPLING



ONE COUPLING to meet the demand for ALL SIZES

The ROMORT Universal Air Hose Coupling takes all sizes of hose as illustrated, or any hose from 5/16 to ¾ inches, outside diameter, whether plain or armored.

The other end of the connection is a ¼ inch thread and fits all ROMORT Automatic Air Valves or other standard connections with standard ¼ inch pipe threads.

The ROMORT Universal Coupling is made of high duty brass with a white nickel finish.

It can be attached to any hose in a minute and positively cannot leak.

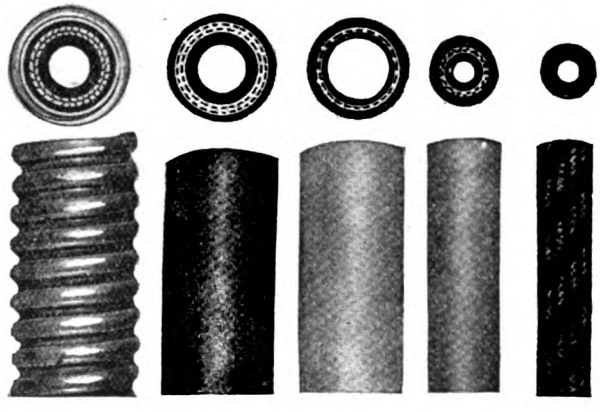
The ROMORT Universal Coupling can be changed from one size of hose to another size at any time.

This is an ideal proposition for jobbers and dealers.

Instead of several different sizes to carry in stock there is but one size ROMORT Universal Coupling.

We have a proposition for jobbers and dealers that is mighty interesting.

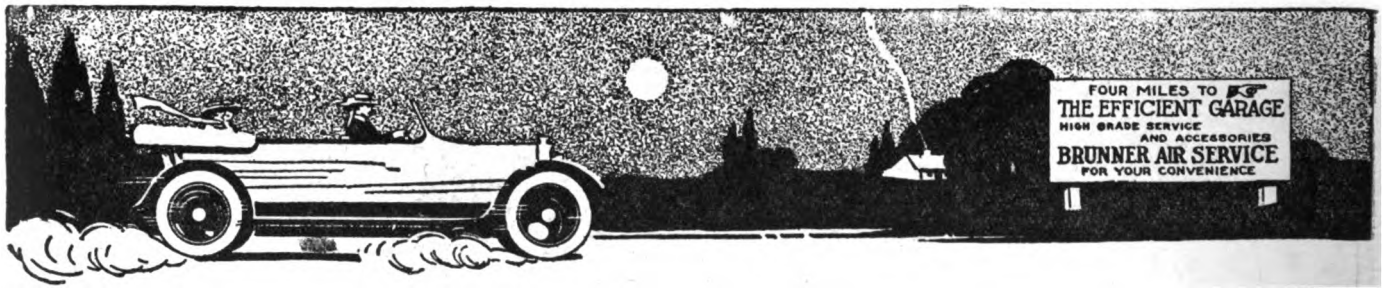
Write for details.



Manufacturers
ROMORT MANUFACTURING COMPANY
Oakfield, Wis., Chicago, Ill.

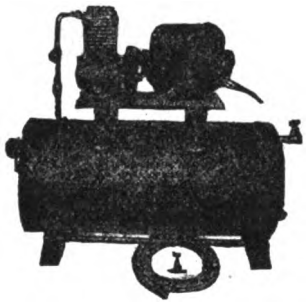
Sales Department
THE ZINKE COMPANY
1323 S. Michigan Ave., Chicago, Ill.

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Does Your Air Service Pay You?—It Should

Some garagemen fail to realize the necessity of an efficient compressed air system, a leaking tank, valve or hose line compels the compressor to work overtime to replace the wasted air, shortens the life of the compressor and increases the operating cost.



No. 542 Motor Driven Outfit

The outfit includes air gauge, check valves, 25 feet of 3/16" "Resistoil" air hose connected to one No. 82 needle valve on one end and having automatic tire connections on the other.



Get a Brunner Air Sign

It is your best advertisement. It tells the motorist of a garage service sure to please. It gives the motorist confidence in your garage. Display it.

A profitable air service requires not only a Brunner compressor, but a Brunner outfit, Brunner fittings, and a Brunner open-hearth steel tank. Ordinary fittings will not do and a "Range Boiler" used as tank is absolutely unsafe.

INSTALL A BRUNNER GARAGE AIR SYSTEM

This No. 542 Brunner motor-driven outfit with a Model M Brunner automatic controller will automatically maintain a working air pressure between 115 and 140 pounds and will save you both time and labor and will greatly increase the efficiency of your air service. It has ample capacity for garages housing up to 40 or 60 cars; the motor is half horsepower, securely bolted to substantial cast iron base and mounted on a thirty-two gallon open hearth flange steel air tank, tested to 300 pounds. The compressor is our No. 102 two-cylinder, air-cooled, each cylinder fitted with safety valve that can be instantly set for any desired pressure and absolutely dependable under all conditions.

Let us send you Catalog No. 50 and the name of the Jobber handling Brunner Compressed Air Systems in your territory

Brunner Manufacturing Company

General Office and Plant: Utica, N. Y.

Cincinnati Branch, Cincinnati, Ohio



THE BRUNNERWISE MOTORIST

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Of Timely Interest to Garages and Tire Shops

2 Valuable Machines in 1

NOW is the time to investigate this new Usaco unit. Don't wait until you have bought two less efficient machines at a greater outlay and then experience regret.

This new number combines an automatic air compressor and a buffer or grinder head into one compact unit so that either can be operated or both at the same time.

It saves the cost of one motor with shafting or countershaft, needs no special installation, conserves valuable space and renders satisfactory service far above the average.

The compressor unit is the **De Luxe.** Two Stage Compressor as found in a majority of the better establishments and the buffer or grinder head is of improved design.

We can also furnish this Compressor without buffer but with double end shaft and pulley for driving separate buffer, drill press, line shaft or other small machine.

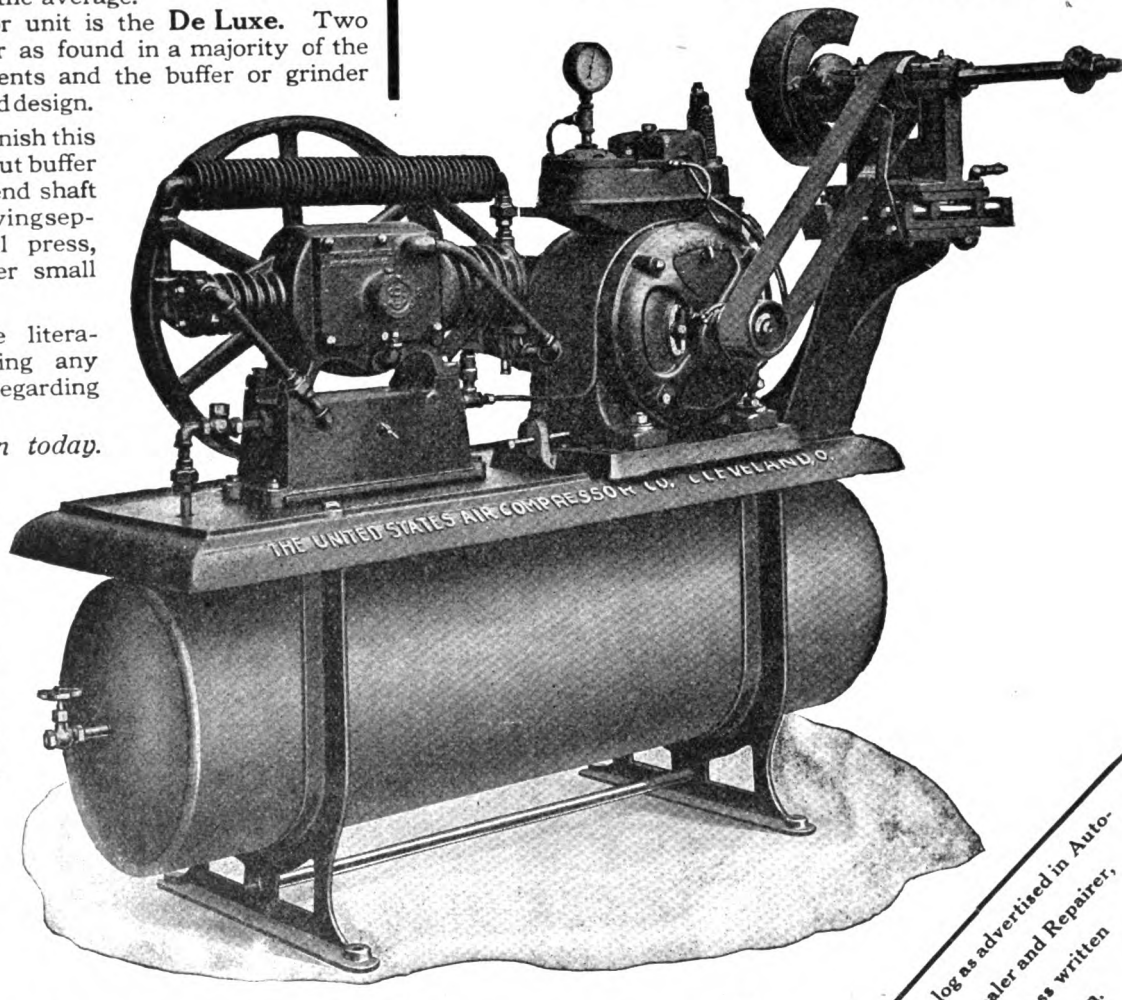
Get descriptive literature before making any arrangements regarding new equipment.

Mail the Coupon today.

The DeLuxe
Two Stage

Usaco
AIR COMPRESSORS
TRADE MARK

Combined
Air Compressor and Buffer



More Than 20 Different Usaco Garage Air Units in Two Stage and Single Stage Types.

Send Coupon for Catalog.

Send Catalog as advertised in Automobile Dealer and Repairer, to address written in margin.

The United States Air Compresser Co.

6536 Carnegie Avenue Cleveland, Ohio

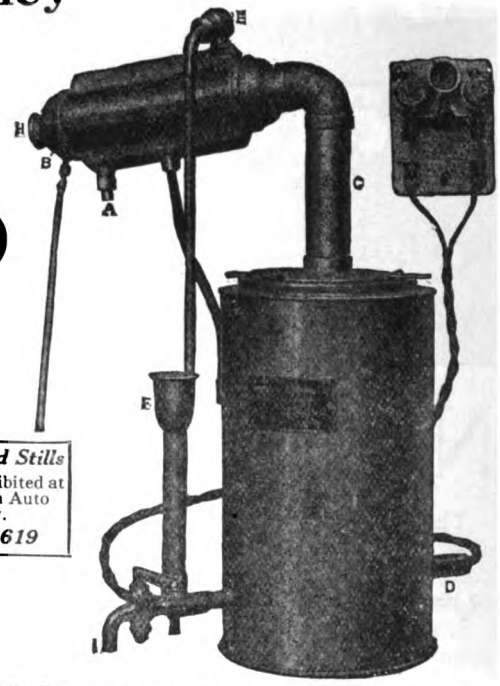
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DON'T BUY DISTILLED WATER

Distill It Yourself and Save Money

Buying distilled water is a waste of money. The profits that you should have go to someone else. Distill the water yourself and save money by using

The BARNSTEAD WATER STILL



Barnstead Water Stills are high-grade stills made by a firm occupying the foremost position in this field. They are carefully built and thoroughly tested. Operate at extremely low cost with electricity, steam, kerosene or gas. Once started, the operation of the still is automatic, requiring no attention. We have stills that suit your requirements. Let us know just what these requirements are and we will be glad to send you illustrated booklet.

Barnstead Stills Will be Exhibited at the Boston Auto Show. *Space 619*

BARNSTEAD STILL & STERILIZER CO.
3 LANESVILLE TERRACE, FOREST HILLS, BOSTON, MASS.

Barnstead Stills are made in sizes to produce one-half gallon per hour up of distilled water. A still containing a ½-gallon capacity will cost $18.70 and last indefinitely.

A D & R

IF YOU'VE GOT A GOOD THING

back it up with good advertising copy in the Automobile Dealer and Repairer — don't let your product die of dry rot.

In our "put it over" department we create advertising ideas, draw pictures, border designs and lay-outs which attract the reader's attention—holding, at the same time, the proper commercial value.

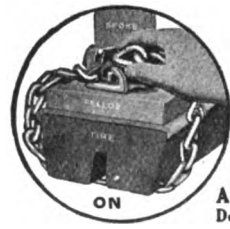
We write advertising that will boost your product—bring it from obscurity and, through our medium, put it into the markets of the world.

Write or Wire

MOTOR VEHICLE PUBLISHING CO.
71-73 MURRAY STREET : : NEW YORK CITY

ARROW GRIP

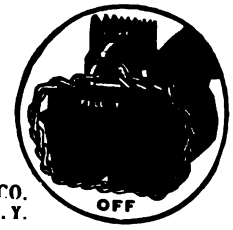
NON-SKID CHAINS FOR SOLID TIRE VEHICLES



Simplicity Safety Salability

Easy to Attach and Detach

A Size to Fit Every Spoke — Round or Square



ARROW GRIP MFG. CO.
Dept., I. Glens Falls, N. Y.

Three Distributing Depots:
Chicago..... 617-19 Fulton Street
New York..... Arrow Specialty Co., 16 West 61st Street
Montreal, Que., Canadian Fairbanks-Morse Co., Ltd., 84-98 St. Antoine St.

SAVIDGE UNIVERSAL VALVE LATHE

$12.00

95%

of the *usual* valve grinding is absolutely unnecessary.

The *Savidge way* means a quick — accurate — perfect fit with each valve—*every time*—at a fraction of the time and labor.



Capacity—45° or 30° heads up to 2½ inch,—stems up to 7/16 inch.

Get Your Jobs Out Quick—Increase Your Profit.
Take Care of More Customers.
Satisfy All—Please Your Trade with Quality Work.

Workmanship and material fully guaranteed,—money back if not pleased after 10 days. Folder describes this and Junior Model.

A. C. SAVIDGE, No. 2 Williams Building, Indianapolis, Ind.

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EKERN'S
Portable Garage Grease Guns

Clean, Quick, No Waste of Oil or Grease. Always ready for use and practically indestructible.



Model K

Keep your grease off the floor and prevent waste. Registers the exact amount of grease sold to a customer. These guns will save their cost in a very short time. Are handy, portable, and can be moved to any part of the shop as they are on rollers. Can be re-filled in one or two minutes.

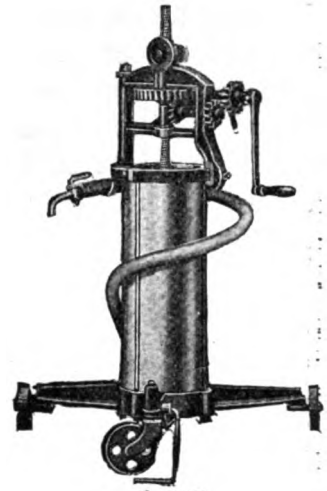
Model K holds 20 pounds of grease or 2½ gallons of oil.

Model N holds 56 pounds of grease or 7 gallons of oil.

Your jobber handles these guns.

Order one from him immediately and install it in your garage.

This Means Bigger Profits for Every Garage Man.



Model N

McPars

1410-12-14 SO. MICHIGAN BOULEVARD, CHICAGO, ILL.

FOR PROFITABLE REPAIRS

The shop seeking battery repairs must be in a position to handle them profitably. A little time—a little strength saved—and material salvaged in every job means just that much more profit—an extra profit that soon pays for these devices to make it possible. They are designed for your benefit.

AMBU CADMIUM TEST OUTFIT.—To test both sets of plates in the storage battery without taking it down. This is proving one of the greatest labor savers—time savers—and battery savers ever offered to the repair man. Consists of specially calibrated and voltmeter with the indicated correct readings shown on the dial in red. A pair of rubber tipped cadmium leads to reach the different plates. Packed in convenient cases with complete instructions. Outfit, complete, **$25.00.** Voltmeter only **$22.50.** Cadmium leads only **$3.00.**

AMBU BATTERY STEAMER.—Softens compound in battery in 15 minutes without danger of injury to jar or connections. Needs no attention. Works while you are busy. Price, complete, **$25.00.**

AMBU BATTERY PLATE PRESS.—To press plates. One of the most valuable "salvage" devices in any shop. **$32.50.**

AMBU PLATE BURNING RACK.—To hold battery plates in position while burning in new ones. Great time saver. **$7.50.**



AMBU LEAD MOLDS.—For molding into convenient, usable form lead scrap and trimmings. Most shops need several. Each **$1.75; $3.25.**

AMBU WIRING DIAGRAMS.—All the 1917 and 1918 cars electrical systems diagrammed. Book of over 180 for **$3.50**; single sheet diagrams of older models, **25 cents** each.

"AUTO STORAGE BATTERY."—A book that tells in simple language all about the care and repair of storage batteries. **$5.00.**

Your jobber is in business for YOUR benefit. While he makes a small profit on the goods he sells he saves you far more in time, worry and money.

If he cannot supply you, write direct to

American Bureau of Engineering, 1025 S. Wabash Ave., Chicago

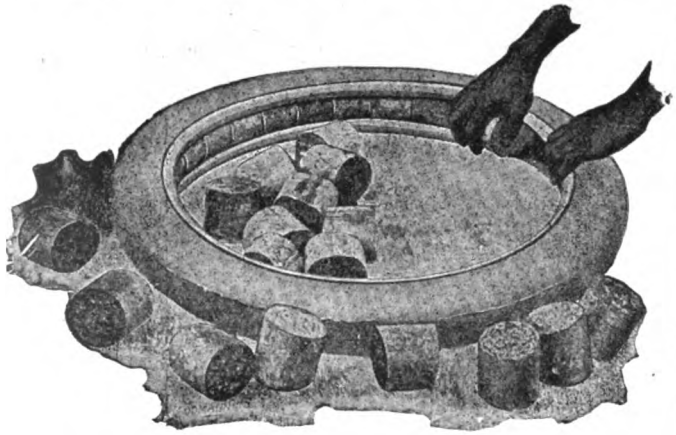
Makers of the famous AMBU Trouble Shooter

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How You Can Conserve With National Rubber Tire Filler

More Miles per Tire, Less Tires to Buy, No Buying of Tubes at All.

During the period of the war we learned to conserve in many ways,—Food, Fuel, Farmstuff, Man-power and Transportation Facilities were first. The use of NATIONAL RUBBER TIRE FILLER offers you a medium for continuing to conserve without any sacrifice whatever.



Motorists Have No Tire Trouble Who Ride on This Perfect Substitute for Air

Rim-cut-proof, blowout-proof, puncture-proof tires are now a reality. Motoring is now freed from the shackles of tire trouble, and is made safe, comfortable and enjoyable.

National Rubber Tire Filler replaces the inner tube. It has all the resiliency of an air-filled tire with none of its disadvantages. It lasts indefinitely—40,000 miles or more. It has been in use for seven years and has conclusively proven its superiority and economy over air-filled tires. Our factory taxed to capacity is proof positive of its great popularity.

It rides as easy as air.
It cannot puncture or blowout.
It can be used in all style tires.
It can be installed on all makes of rims.
It doubles tire mileage.
It is easily installed.
It stimulates motoring.

National Rubber Filler Co.

208 College Street Midlothian, Texas

Service Stations and Garagemen

Big worth-while profits with astonishing increase of trade

immediately follows your taking on

NEW YORK REPLACEMENT IGNITION COILS



TYPE-J

95% of all cars are coil equipped —every one a prospect. No large investment necessary. A few dollars will start you because a small quantity of different model coils fit ALL CARS.

Fifteen years coil building experience enables us to produce a coil that gives a crashing big hot spark—even when battery is low —that insures easy starting and perfect running on present day low grade gas.

They are guaranteed for the life of the car. Don't let your competitor get the nicest piece of business ever offered but write today for trade prices and circular giving list of proper coil for each model car.

NEW YORK COIL CO.

338 Pearl Street New York, N. Y.

Mid West Distributors—GRAY-HEATH CO.
1440 Michigan Avenue Chicago, Ill.

Cold Weather Efficiency Is Built Into This Carburetor



Price with Auxiliary Air Control **$12.00**

The D. & B. Carburetor is designed and developed exclusively for Ford cars.

The Springless Mixing Valve and Auxiliary Air Control insures a quick start in zero weather as well as in tropical heat.

The air and gasoline is measured accurately without depending upon springs or other weak construction.

A constant gasoline level is maintained by a leak-proof metal float.

Easily installed by anyone.

Earns it cost many times in gasoline saving and increased motor efficiency.

Be independent of weather conditions.

Sold by Live Dealers Everywhere

If your dealer does not carry the D. & B., we will ship, charges prepaid, on receipt of price, **$12.00.**

MANUFACTURED BY

O. C. HARRINGTON CO., 341-345 N. Crawford Avenue, CHICAGO, ILL.

Mid West Distributors:
GRAY-HEATH CO.,
1440 Michigan Ave., Chicago, Ill.

New England Distributors:
THE POST & LESTER CO.,
112 Allyn St., Hartford, Conn.

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At Our Risk- You Can Prove it.

DON'T waste good money on tire pumps that either break your back, or pump *Rubber Rotting* oil particles or gasoline fumes into your tires.

TAKE NO CHANCES

At our risk you can prove that the "DEAD EASY" is quicker, safer, easier and cheaper than any other tire pump, either engine drive or hand power. Convenient to carry with any car, it is always ready for instant service. The gauge showing exact tire pressure, there is no guesswork—and it's "DEAD EASY."



FREE TRIAL OFFER

Write Today, NOW, for Fifteen-Day — No-Money-in-Advance—Free Trial Offer.

GLOBE MFG. CO.
BATTLE CREEK, MICH. U. S. A.

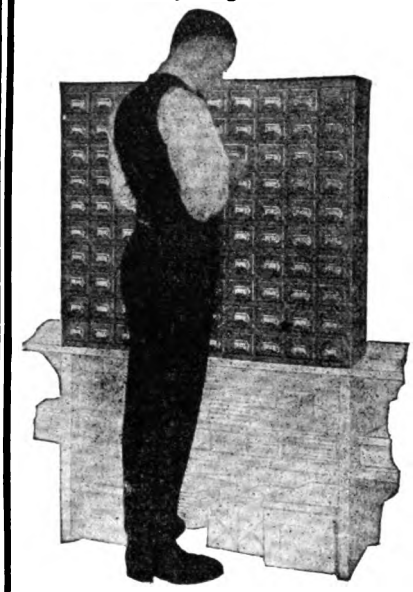
SAVE TIME! SAVE MONEY!

USE THE

HB UNIVERSAL SCREW CABINET

(100 COMPARTMENTS)

The Garage Man's one best bet for storing small, valuable repair parts, tools and accessories. Serviceable, economical, attractive, and prevents loss and waste. Gives room for everything.



HB Universal Screw Cabinets

will hold screws, ball bearings, brushes, battery connections, bushings, couplings, cotter pins, nuts, nails, bolts, tools, switches, spark plugs, fuses, rivets, supplies, accessories, etc.

The 100 drawer Cabinet illustrated is 43 in. wide, 39 in. high, 11 in. deep. Drawers are 8x3x2½, inside measurement. Shipping weight, 120 lbs. Price, $34.60. Shipped direct from factory. Same Cabinet in 50 drawer size, price $19.85.

HB Cabinets are sold direct to garage men under our absolute money-back guarantee. You run no risk in ordering from this advertisement.

For Complete Information, Write

HOBART BROTHERS CO., Box D2, TROY, OHIO

"Built-In" Strength and Resiliency

The Combination of HALLADAY Underframe Clamp Bumper with the Trussed Spring Bar withstands the hardest jolts and, through its great flexibility, eases off the jar of the bump.

This non-breakable Bumper fits practically every car that is made with extension frame.

The added feature of maximum strength and the attractive appearance of the HALLADAY Trussed Spring Bar will be quickly recognized by the man who knows, as the industry's best bumper for 1919.

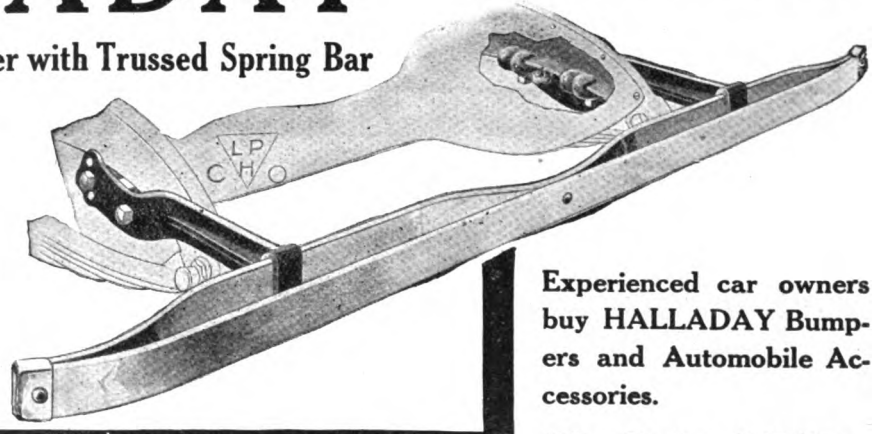
HALLADAY

Underframe Clamp Bumper with Trussed Spring Bar

This new HALLADAY Trussed Spring Bar is one of the leaders of the HALLADAY Line.

Other dealers are increasing their sales and profits with the HALLADAY Line.

Are You Getting Yours?



THE LATEST WORD IN BUMPER BAR CONSTRUCTION

Experienced car owners buy HALLADAY Bumpers and Automobile Accessories.

Wise Dealers Sell Them

L. P. HALLADAY COMPANY, STREATOR, ILLINOIS.

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BEACH AUTOMATIC GRIP PULLER

The One Best Bet in a Wheel and Gear Puller



Make Your Gear and Wheel Pulling Show a Profit.

A ONE-MAN PULLER

Quick acting, strong, and simple in the extreme. This positive grip is a garage necessity that is worth its weight in gold. It adjusts to work instantly and can be locked in any desired position.

Ten Days' Trial

If your dealer or jobber does not have them, we will send you one. Try it ten days. If not satisfactory, return it to us and we will refund your money.

Jobbers and Dealers, Get our Proposition

We Also Make the Beach Rim Tool

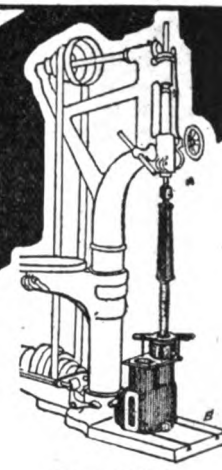
THE GREB COMPANY, 197 STATE ST. BOSTON, MASS.

Look for these tools at the Automobile Shows

May we show how profits can be increased.

STORM

CYLINDER RE-BORING MACHINES



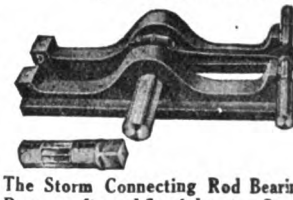
Storm Cylinder Reboring Machine

OF course you are interested in getting the maximum profits out of your repair business. You owe it to yourself to investigate a line of equipment that is saving time, labor and money in hundreds of repair shops.

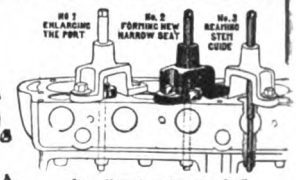
Our line includes the

STORM Cylinder Reboring Machines
STORM Piston Vise
STORM Valve Port Renewing Outfit
STORM Connecting Rod Bearing Reamer, Jig and Straightening Gauge

Write today for catalogue giving us your jobber's name



The Storm Connecting Rod Bearing Reamer, Jig and Straightening Gauge



Storm Valve Port Renewing Outfit

STORM MFG CO.

Dept. A-26 THOMPSON, IOWA

WHY USE SHELLAC?



When You Can Obtain Far Better Results With

Permatex Gasket Cement

Produces a pressure-tight union that is gasoline, kerosene, oil and water proof and has a heat resistance five times that of shellac.

If Your Jobber Cannot Supply You, Order Direct

LIST PRICES

2-oz. Swab Bottles, 20c each ¼-pt. Cans, 30c each 1-pt. Cans, 90c each
1-qt. Cans, $1.68 each 1-gal. Cans, $6.00 each

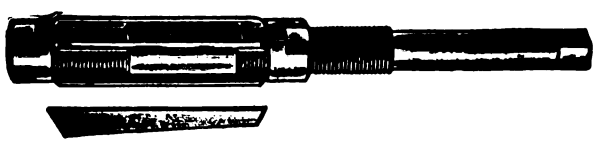
CONSTANT A. BENOIT, JEROME AVE. & E. 18th St., BROOKLYN, N. Y.

The best made for repair work

The Critchley Expanding Reamer

Reg. U. S. Patent Office

Try One and You Will Want More.



Reams odd size holes

Send for Circular

CHADWICK & TREFETHEN

32 BOW STREET PORTSMOUTH, N. H.

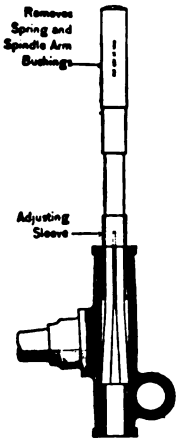
I AM THE FOUNTAIN HEAD OF THE ABUNDANCE OF THINGS

I KEEP the populace awake when otherwise they would slumber—I am the active agent stirring up work for millions of men and women—I keep doors from rusting on their hinges—I make folks think—I compel them to open their purses and buy anything—Everything that is good—I am Advertising.

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"MOSCO" JIFFY Bushing Remover

A Practical Tool



For FORD, DODGE, DORT, OVERLAND, SAXON, MAXWELL, CHEVROLET, and all Cars, Trucks and Tractors using a ½ in. spindle bolt.

Fitted with sleeve which keeps split end of tool compressed until properly located.

WHAT IT DOES. Removes bushings from steering knuckle, spindle arm and springs, and does it so quickly that it pays for itself the first time used. Made of steel Case Hardened.

Please Order Through Your Jobber.

MOTOR SPECIALTIES CO.
Manufacturers - Waltham, Mass.



BEACH

"Wallop" your rim with a hammer to force it in or out of place and you are bound to have greater trouble next time.

Do The Sensible Thing

Provide yourself with the best rim tool on the market and save time, trouble and rims. With the

Beach Rim Tool

You can quickly expand or contract any make of cross-split demountable rim—the Beach is universal and takes them all.

Ten Days' Trial If your dealer or jobber does not have them, we will send you one. Try it for ten days. If not satisfactory, return it to us and we will refund your money.

JOBBERS AND DEALERS, Get Our Proposition
We also make the Beach Automatic Grip wheel puller

THE GREB CO., 197 STATE STREET, BOSTON, - MASS.
"Look for These Tools at the Automobile Shows"



LOCK ROLL HOSE CLAMPS

SAVE TIME- LABOR- HOSE- MONEY

Rust proof, a unique dark finish or nickel plated. Outside diameter hose sizes ⅝" to 3½" by ⅛" variations. Send today for Samples, Price List and Discount.

FEDERAL TIN CO., Inc., Sole Manufacturers
Charles and Barre Streets, BALTIMORE, MD.



A Quick and Everlasting Repair

20th CENTURY'S
Self-Vulcanizing Rubber Back Patch

It is made from a high grade of rubber of two-ply construction. The red prepared rubber face is much superior to the ordinary gray or black rubber facing. The black rubber is similar to inner-tube stock so that when applied it stretches in all directions with the tube, eliminating the strain at the edge. When properly applied this patch will last as long as the inner-tube, and will not leak, loosen, creep or blow out.

NOTE:—Rubber coats, rubber boots, hot water bottles and many kinds of rubber goods can be successfully repaired with this outfit.

CARTON CONTAINS COMPLETE OUTFIT
Consisting of Sheet Self-Vulcanizing Rubber Patch, One Tube Special 20th Century Cement, One Sheet Sandpaper. Put up in three different sizes.

If not found with your JOBBER or DEALER, write to us direct.

20th CENTURY TIRE PROTECTOR CO., MIDLOTHIAN, TEXAS

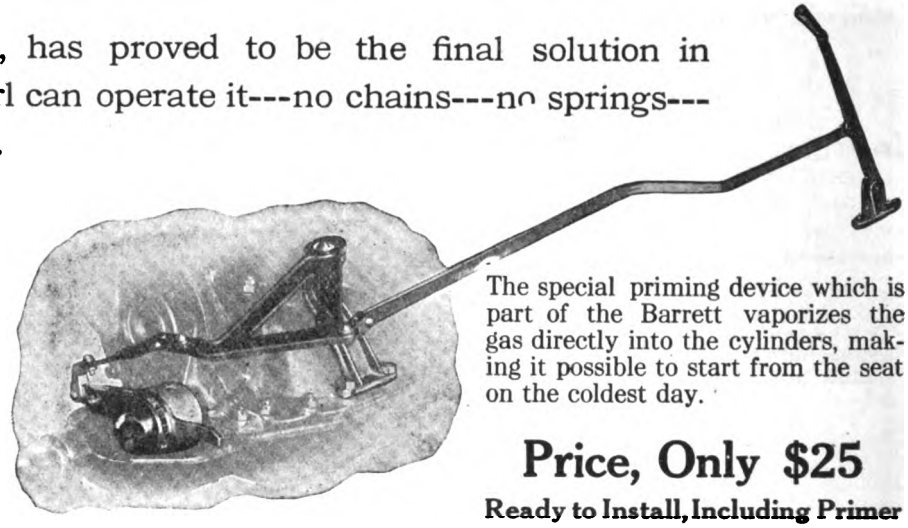
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Mr. Sole Distributor---

THE BARRETT FORD STARTER

now being introduced, has proved to be the final solution in Starters. A boy or girl can operate it---no chains---no springs---no batteries---no wires.

1. No up-keep.
2. Easy to install.
3. No holes to drill.
4. Takes no power away from the engine.
5. 75% more leverage than with a hand crank.
6. Automatically releasing gear on back-kick, thus eliminating all danger.
7. Each and every piece of the Barrett Motor Starter guaranteed for 5 years.
8. Simplicity of construction and operation.
9. Essential parts made of Chrome Nickel Steel, case hardened.
10. Ready for starting any time and as often as wanted, because it does not depend on the running of the engine for power.



The special priming device which is part of the Barrett vaporizes the gas directly into the cylinders, making it possible to start from the seat on the coldest day.

Price, Only $25

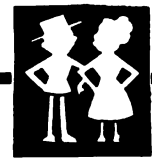
Ready to Install, Including Primer

Call on us at the Boston Show and see this wonderful Starter demonstrated. Or write us at once for free Descriptive Folder

BARRETT MOTOR STARTER MANUFACTURING COMPANY

1779 BROADWAY, NEW YORK CITY

"Come! let's get out the little old car!"



"We'll do it! she needs overhauling anyhow."

To Makers of— PAINTS, VARNISHES, AUTO FINISHES, AUTOMOBILE ACCESSORIES and EQUIPMENT.

The Country Blacksmith is a Steady Buyer

Get your advertisement into the next number of

The BLACKSMITH & WHEELWRIGHT

IT WILL PAY YOU

SPRING IS HERE—NOW IS THE TIME! WRITE OR TELEGRAPH.

M. T. RICHARDSON COMPANY

PUBLISHERS

71-73 Murray Street, New York City

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EMPRESS GREASE and OIL CUPS

Designed for Use on Every Make of Automobile and Motor Truck in Use Today. Better and More Economical Cups



Open View

Very often it is desirable to substitute oil cups for the grease cups in use on the shackle bolts of the automobile or truck. The cups shown here are designed for that purpose.

There are many other types shown in our catalogue well suited for the Dealer's and Repairman's stock.



Style B. Lift top self closing Oiler. Same as D Oiler.

Write for Catalogue "C" Today



Closed View
A substantial self closing hinge lid Oiler, made from pressed steel.

BOWEN PRODUCTS CORP.

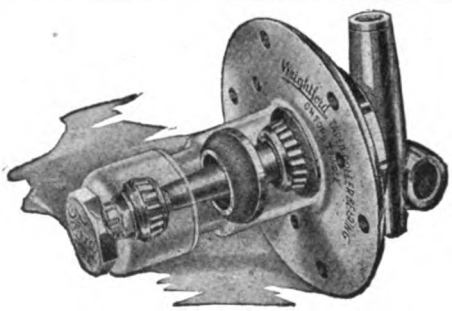
Auburn Div., Auburn, N. Y.
Zerk Div., Cleveland, O.
Canadian Winkley Co. Windsor, Ont.
Winkley Div., Detroit, Mich.
Stahl Div., Minneapolis, Minn.



Style D. Flip top self closing Oiler. Malleable iron body, steel cap and center.



STOP FORD BEARING TROUBLE



NATIONAL BEARINGS SERVICE CO.
WRIGHT TAPER ROLLER BEARINGS
Replacements for all Standard types of Bearings
PHILADELPHIA NEW YORK

J. & B. TIMERS
FOR
FORD CARS

A few of the exclusive features which you will not find in other makes of Timers:

Patented Oiling Device.



Roller revolves on a hardened bushing and not on a soft rivet pin.

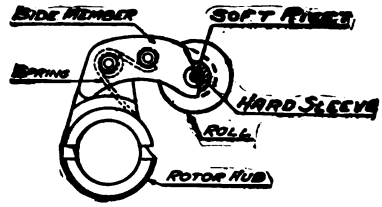
Patented spring construction will not weaken or break.

Timer housing finished with Parker Rust Proof, which is not only a rust-proof, but also an absolute insulator, overcoming all chances of short circuits.

The fibre and steel used in the manufacture of J. & B. Timers are the best obtainable.

Price $1.40

Sold by all Jobbers.



Manufactured by

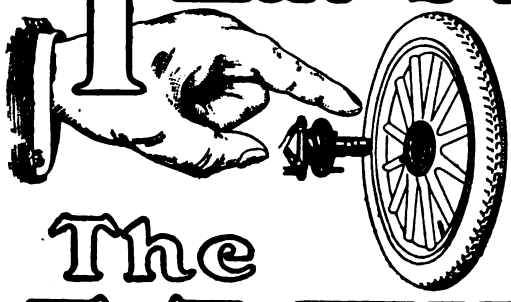
J. & B. MANUFACTURING CO.,
PITTSFIELD, MASS.

Extra Rotors interchangeable with all makes of roller type timers, 45¢ each.

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"E-Z-WAY" DEMOUNTABLE OUTFIT

That's it—



FOR FORD CARS

The E-Z-WAY

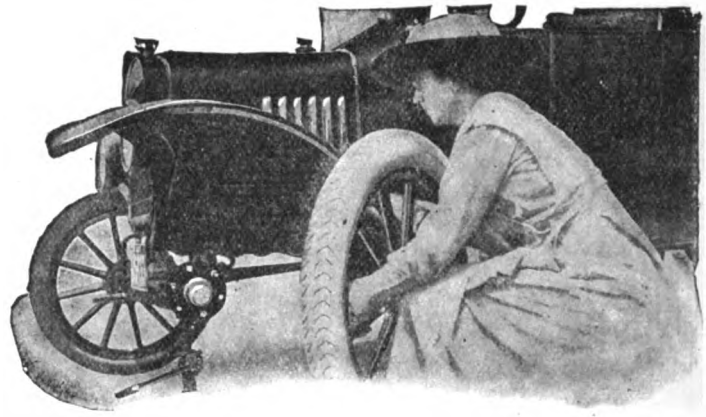
Change of Wheels so Simple and Easy.

When you have a puncture or blowout—you jack the car up—there is only one tool you need—the Socket Wrench—which comes with the outfit. Only three nuts to remove—slide the wheel off easily—slide on the spare wheel—replace the three nuts—and away you go in three minutes.

No dirt—grease—soiled hands or clothing—in pleasant frame of mind—enjoyed your day's outing.

Complete Set Only $15.00

Including Spare Wheel and Carrier



Suppose one of your wheels broke—the cost of sending or going for a new wheel or being towed to the nearest service station would cost as much as the "E-Z-WAY" besides the delay and loss of time.

The saving in tire cost alone equipping car with the "E-Z-WAY" over demountable rims will more than pay for the outfit. If you equip with rims you must buy 3½" tires and tubes, whereas with the "E-Z-WAY" you use the present Ford wheel and tires on car. The extra spare wheel furnished with outfit is interchangeable on the four corners of the car. It's a great success, because it's easy.

Write to us for full information. Good dealers' proposition.

"E-Z-WAY" DEMOUNTABLE WHEEL CO.

2610 ATLANTIC AVENUE BROOKLYN, N. Y.

THE WORLD DOES NOT NECESSARILY OWE YOU A LIVING UNLESS YOU MAKE A MOVE TO GET IT!





THE REGULAR MARCH 1919 ISSUE OF THE

Automobile Dealer and Repairer will be an

OVERHAUL and EQUIPMENT NUMBER

The Spring season is the most active of all the year among garagemen, repairmen and accessory dealers. It is the real BUYING SEASON.

What's the use of a long story? Do you want those fellows in the trade to buy YOUR goods? If so, you will only need this hint to remind you to send us your reservation for display advertising space in this really

IMPORTANT SPECIAL NUMBER.

If you want our representative to call, he will be "on the job" right away. Why not let us quote rates at once by mail? Our CRACKER-JACK Copy Service is yours to command.

Write or wire for space NOW. Don't forget Final Forms close March 5th, but do not wait till the last minute. We can always give better attention to EARLY orders.

Motor Vehicle Publishing Co., 71-73 Murray St., New York City

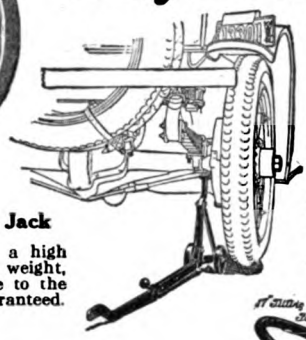
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"Why Don't You Get All that's Coming To You in Supply Profits?"

Asks Jem Coe, the Cop

With the GEMCO line, you can offer the motorist a brand he knows, at a price he'll pay. There'll be a shortage of new cars for the next two or three years. This means the old cars will be made more comfortable with accessories on which *some* dealers will make good profits. Will you be one of those dealers? A few of the big winners in the GEMCO line are shown here. Write for a GEMCO catalog and be ready to get *all* your share of this business.



One-Stroke Service Jack

is adjusted quickly to lift a high or low car, regardless of weight, merely by pushing handle to the floor. Satisfaction guaranteed. List, $15.

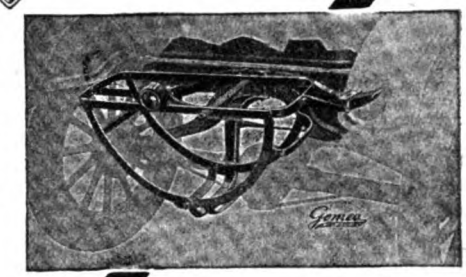


GEMCO E-Z Tilt Steering Wheels

for Ford and Chevrolet "490" cars are conveniently and quickly tilted. No time is required for releasing nor for relocking. The mechanism is simple in design and absolutely first-class in every other respect.



Easily the most universally adaptable of the GEMCO Bumpers. It is of a very attractive design—is heavier than the GEMCO Special, fits more cars, and like the Special, may be used as a rear end bumper.



Basket Type Tire Carrier

A fast-selling Ford Accessory. Furnished with Bumper or without. GEMCO Tire Lock can be attached. List, $5.80 without Bumper.

Gemco MILWAUKEE "POPULAR AUTOMOBILE ACCESSORIES"

Accessories

are made in a big factory devoted exclusively to this line.

Write for Complete Illustrated Catalog.

Gemco Manufacturing Company

656 South Pierce Street, Milwaukee, Wis.

Install a Curtis Air Compressor



Display a CURTIS "FREE AIR" SIGN above your door—it inspires confidence and will help build your business. Motorists are looking for this familiar CURTIS slogan—because they know oil rots tires—and that a CURTIS Air Compressor furnishes AIR FREE FROM OIL, which means fewer blowouts, greater tire mileage and less repairs. The CURTIS is the ONLY Garage Air Compressor with the controlled splash oiling system that eliminates all danger of forcing oil into the air line.

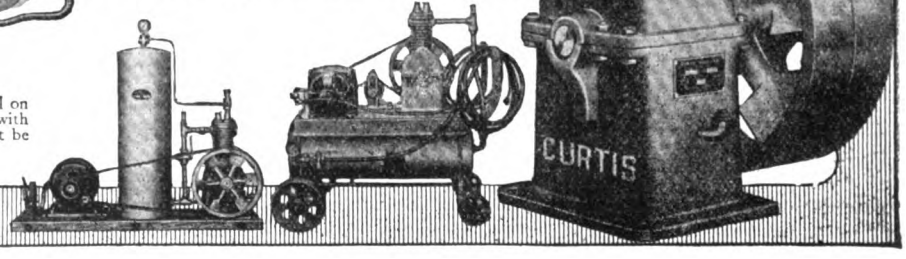
CURTIS AIR FREE FROM OIL

Investigate the many exclusive features of CURTIS Garage Air Compressors. The line is complete—five sizes—stationary or portable. Just write your name and address on the margin of this advertisement—tear it out and send it to your jobber, or to us direct, for complete information and prices.

Curtis Pneumatic Machinery Co.

1530 Kienlen Ave., St. Louis, Mo.

Branch Office—530-E Hudson Terminal, New York City



The Curtis Sign

Illustrated above—is 10x14 inches—baked enamel on steel. Cannot be bought, but is furnished FREE with every CURTIS Garage Air Compressor—and cannot be had in any other way.

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"THAT'S A LOAD OFF MY MIND!"

No more worry—no more "cussin"—no more losses—I've got——

THE ALLIANCE CONTROLLER

attached to all my Vulcanizing machines—and I never felt so happy in my life." That's what they tell us and it's true that—**The Alliance Controller Automatically regulates the gas consumption and holds steam pressure at desired point.**

It allows a full flow of gas to the burner to bring the steam up to the desired point quickly, and then automatically regulates the gas to the exact quantity needed to hold that pressure.

The Controller is easily adjusted and needs no further attention. Simply light your burner and forget it. Your steam will always stay at the pressure you want to carry.



Controller Installed on Akron-Williams Mold



Complete instructions with Each Controller. **$7.50 each.**

THE ALLIANCE CONTROLLER COMPANY,
Main Street, Alliance, Ohio, U. S. A.

Seamless Steel Tubing

Over 3,000,000 Feet on Hand.

2000 SIZES. YOUR SIZE IS HERE

ALSO COLD DRAWN SEAMLESS TOOL STEEL TUBING

WRITE NEAREST OFFICE

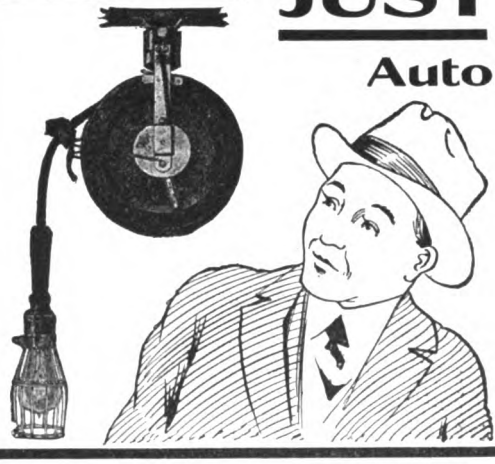
EDGAR T. WARD'S SONS CO.

BOSTON NEW YORK NEWARK CHICAGO PHILADELPHIA

JUST WHAT I WANT

Automatic Extension Reel

For Electric Lamps



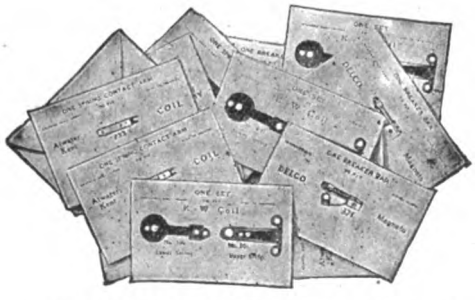
Take your lamp with you to any part of your machine shop or garage—an automatic lock holds the lamp at any desired distance from the reel. It can't get out of order because it's professionally manufactured.

Tisn't a half-baked proposition nor an amateur outfit—but a splendidly strong Extension Reel for men who haven't got time to bother with any nonsensical makeshift. Equipped with 25 feet of reinforced cord. It's all good quality—don't cost much either. Approved by the Underwriters.

Write for Particulars

The Cincinnati Specialty Mfg Co., Inc.

Sylvan Ave. and Powers Street - CINCINNATI, OHIO



THE INDIVIDUAL CONTAINER LINE
IGNITION PARTS and BRUSHES

On each Container is printed a full description of the part and a complete list giving cars on which the part or brush is used.

ABSOLUTE PROTECTION TO THE PART OR BRUSH.
EASY AND QUICK IDENTIFICATION. SAVING OF TIME AND TROUBLE.
FURNISHED AT NO ADDITIONAL COST.

Our Display Case and Stock Cabinet (furnished free with moderate order) helps to sell goods and keeps stock in perfect order.

1919 CATALOGUE—Sent Free—A Complete Guide to Ignition and Starter Work.

OTTER MANUFACTURING CO., Inc.,

243 West 17th Street NEW YORK

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SMITH TIRES

THINK OF IT!

A 7,000 Mile Guarantee

Why? Because it's a hand made Tire. Because it possesses strong features that no other tire can claim. Because we practice a strict specialization in the very highest quality materials. It is a major product—matching men's ideals of clean, sane, fair, generous manufacturing. Hand made, head made, heart made—altogether man made—and they show the treatment.



Watch Your Step

Examine carefully other makes of tires—the more you do, the more certain we are of making you a customer.

The sweetness of low price never equals the bitterness of poor quality.

Goods of merit—great value—giving the squarest kind of a deal—these are the three cornerstones on which we are building.

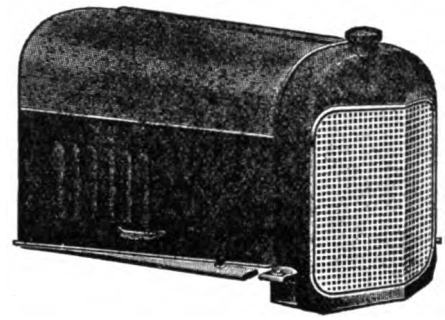
If you would be SURE—buy The Smith $ Saver "S" Tread Tires.

Write Us for Full Particulars

SMITH TIRE CO.
69 Genesee Street, Utica, N. Y.

LIVINGSTON
BULLDOG RADIATOR
FOR FORDS

Ready for Immediate Shipment.



"BULLDOG" COMBINATION RADIATOR AND STREAMLINE HOOD.

One model for 1915 and 1916 Ford Cars.

Special model with water connections to fit the new 1917, 1918 and 1919 model Ford.

Always state the year of your car when ordering.

Black Enamel Finish - - $40.00

F. O. B. NEW YORK CITY

Weight, 46 Lbs. Water Capacity, 3½ Gals. Shipping Weight, 95 Lbs. Extended Starting Crank included.

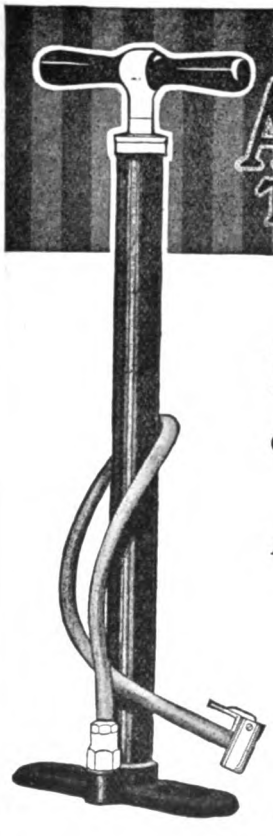
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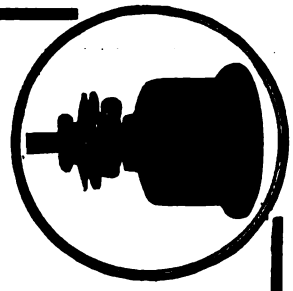
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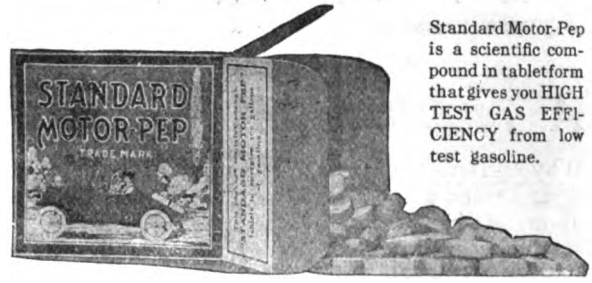
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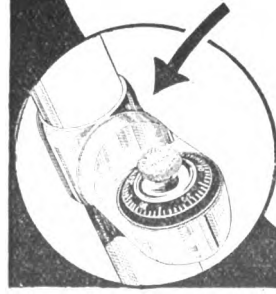
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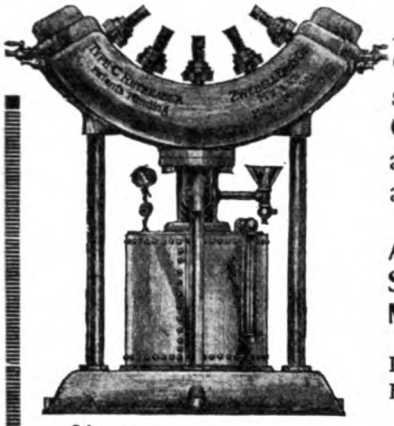


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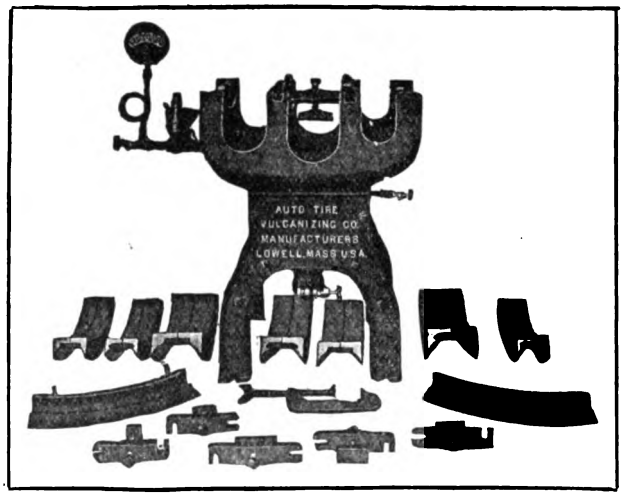
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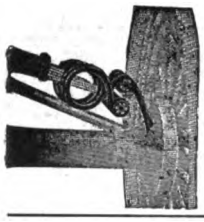
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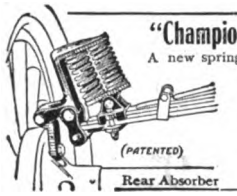
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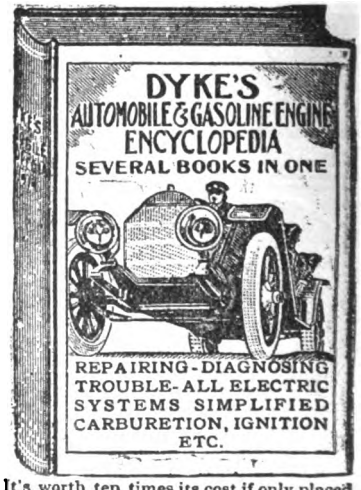
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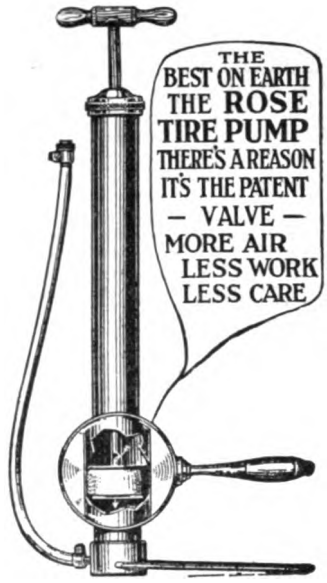
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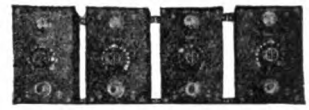
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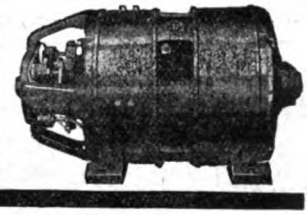
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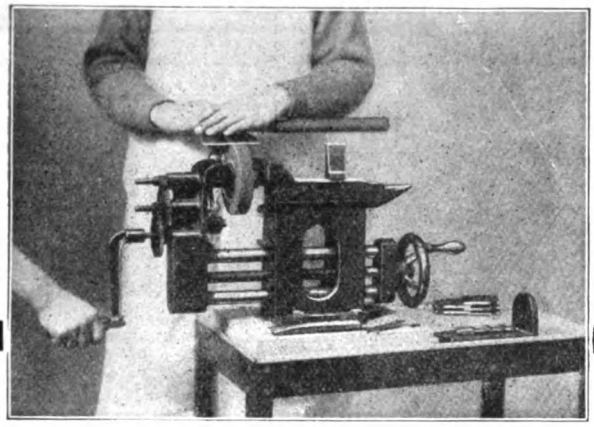


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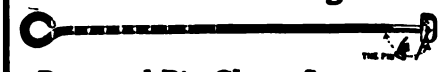
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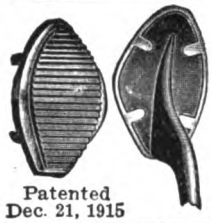
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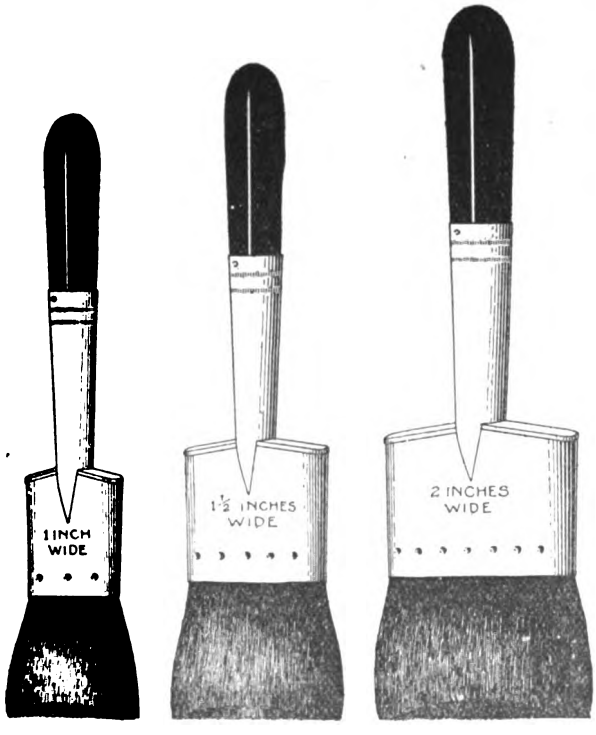
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A Set of Three Brushes and the Automobile Dealer and Repairer for One Year for $2.00.



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Did it ever occur to you that there was much difference between a good paint or varnish brush and a poor one? Probably not. To most people a brush is just a brush. Yet an analysis shows that there is an almost measureless difference between a good brush and poor one.

For instance, a properly made Flowing Fitch brush is hermetically sealed, so as to keep the paint, or whatever may be used, from getting into the brush at the top and loosening the hairs. All such properly made brushes are solidly set in glue cement inside a leak-proof ferrule, and a whole row of neatly clinched nails are driven in at the end of the ferrule to give added security, and a guarantee that the hairs will not pull out.

A Fitch brush is *smooth, soft,* and *flowing,* and does not "mush" up or get flabby like a cheap brush, but holds its springiness. The trouble with cheap brushes is that the ferrule is nothing more than a single band of tin, open at the top, with a couple of nails jabbed through. When you use such a brush the cheap hair will pull out and scatter all over your work, because it is not held securely enough to stand the drag of the brush in painting or varnishing.

A brush may be washed with gasoline or kerosene oil, but to clean it thoroughly turpentine should be used. No brush used for painting should be used for varnishing.

We have recently made arrangements with one of the best manufacturers of these properly made brushes in New York to offer a set of Three in connection with a subscription to the AUTOMOBILE DEALER AND REPAIRER for a year for an even $2.00, except in the 7th and 8th zones the price is $3.00, the subscription rate being $2.00 for a year. These zones comprise the following states: Arizona, California, Colorado, Idaho, Kansas, Montana, Nebraska, Nevada, New Mexico, North Dakota, South Dakota, Oklahoma, Oregon, Utah, Washington and Wyoming; also Canal Zone, Guam, Hawaii and Porto Rico, Samoa, Virgin Islands. These brushes sell at retail for $1.40. It will be seen, therefore, that there is a substantial advantage in sending to us for the AUTOMOBILE DEALER AND REPAIRER for a year, and for a set of these brushes.

Present subscribers can have their subscriptions extended for a year, and secure a set of brushes, on the same terms. These brushes are guaranteed in every respect, and though they cost more than cheap brushes would cost, they are far cheaper in the end, because of their lasting qualities and the good work that can be done with them. No man can afford to waste expensive paint and varnish on any vehicle by using a cheap and poorly constructed brush, such as is usually to be found wherever brushes are sold. The ordinary dealer in brushes himself as a rule has very little knowledge of the quality of the brushes he sells.

Remit by check or money order, and your name will be entered as a subscriber to the AUTOMOBILE DEALER AND REPAIRER for a year, and a set of these brushes, which are just the right size and shape (see illustration, which is exactly one-half the actual size of the brushes,) will be sent to you, postage prepaid.

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Publishers of the Automobile Dealer and Repairer
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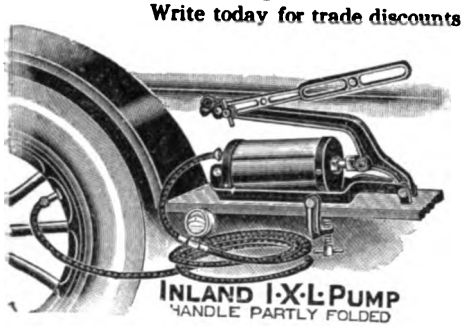
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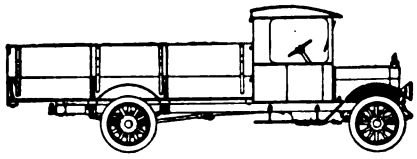
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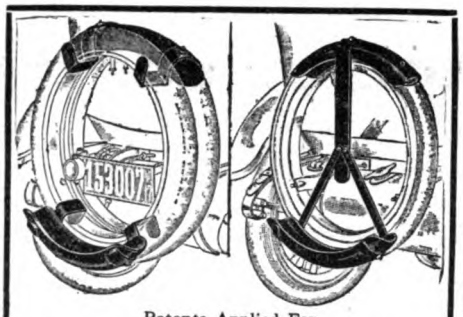
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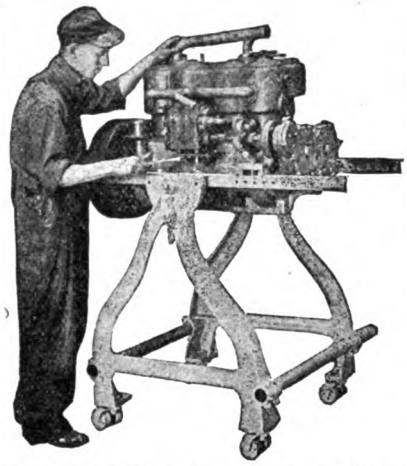


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Fits Over Any Rear Tire

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The second extra tire is supported by the first, the third by the second, the second, etc. Strap all together on both sides. Write for further particulars; our full line will interest you.

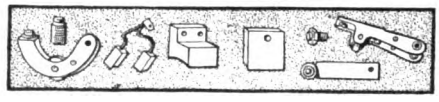
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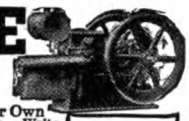
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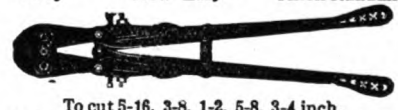
Offer a quick and ready means of connecting storage batteries for charging. Simply fit your connecting cords with these clips and snap them over the battery terminals.
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We are specialists in this work and guarantee you workmanship that will enable you to get full efficiency from your motor, both in performance and economy of fuel. LET US HELP YOU GET MORE POWER AND MORE MILEAGE.

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"Easy" "New Easy" Allen-Randall



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Thousands of dealers recommend it for repairing punctures, blowouts and inner tube tears—it will fix torn-out valve stems and do other difficult jobs—without the need of heat or tools.

See Your Dealer, or Write Us.

ATLAS AUTO SUPPLY CO., 616 W. Austin Ave., Chicago, Ill.

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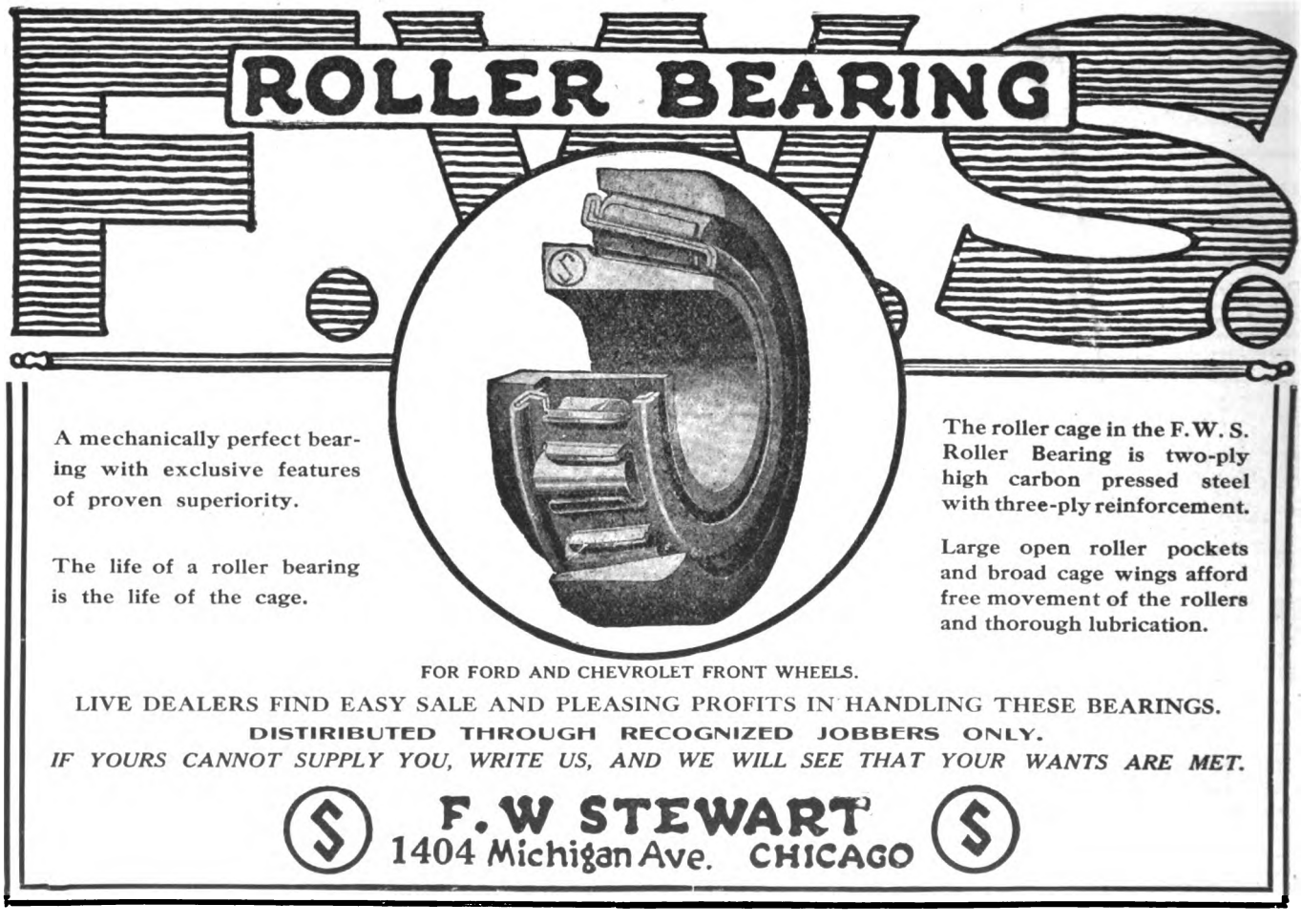
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Refinish Your Car Yourself the PANVAR way

Remember the pride you took in the lustrous finish of your car when it was new? Now—time and the elements have worn away that high gloss varnish and only the the paint remains.

Wouldn't it be worth $1.50 plus one hour's work on your part to replace that brilliant finish your car once had?

You can do it with PANVAR.

PANVAR is a durable, transparent, self-leveling, flow-on finish which you yourself can apply to your car as easily and quickly as you would a liquid polish.

In effect, PANVAR is similar to the high gloss finishing varnish that body builders use as a final coat to give the car its lustre.

Unlike varnish, however, PANVAR can be applied by any amateur with assurance of complete success. PANVAR is quick flowing and self-leveling and no experience is required to apply it.

Unlike varnish, too, PANVAR is not affected by weather changes. It will not crack, craze or peel. It will not discolor from water or steam. It resists heat, acid and rust. Makes tops and leather waterproof.

PANVAR can be applied with a brush, sprayer or cloth and dries with a hard, glossy finish in from six to eight hours.

Garage men make big profits refinishing cars over night.

Jobbers and Dealers—PANVAR sells big during the entire year. It enables car owners to refinish their own cars at small expense and slight effort. Many thousands of owners will welcome this opportunity to save the cost of an expensive repainting job.

Write today for discounts, catalogue, electrotypes and mailing literature.

Dealers—Order direct for delivery through your regular jobber.

A free sample of PANVAR will be mailed upon receipt of 10c. in stamps to cover mailing expense.

THE PANVAR COMPANY, 608 Bulletin Bldg., PHILADELPHIA, PA.
H. A. MEYERCORD, Manager Sales

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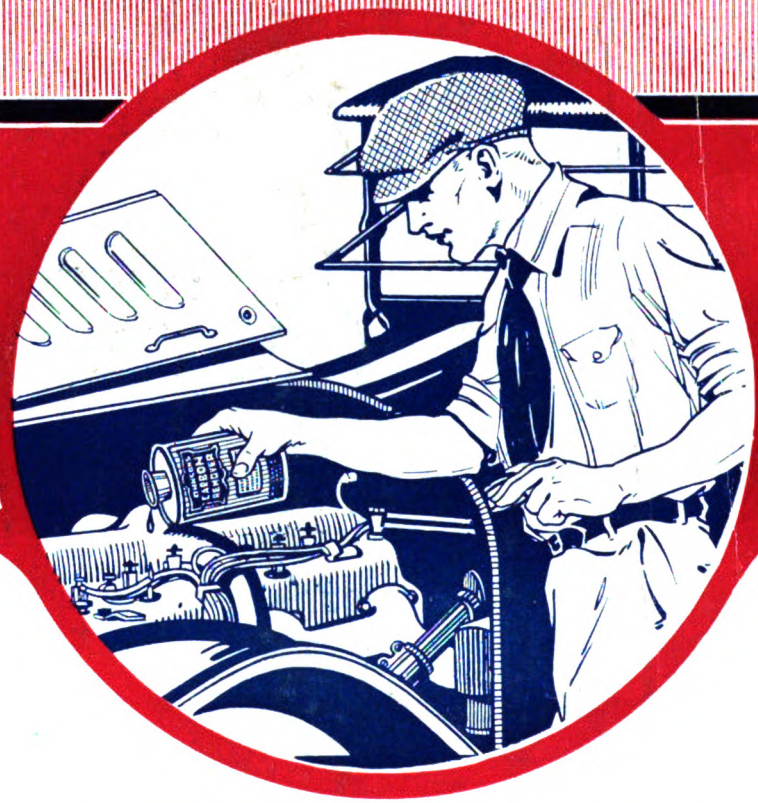
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Increases Power



Saves Gasoline

JOHNSON'S CARBON REMOVER

REGULAR use of Johnson's Carbon Remover—once every 500 or 1000 miles—will cure 80% of your engine troubles, and keep the engine right up to the top notch of efficiency all the time. It will increase your power, save 12% to 25% of the gasoline and reduce maintenance expense.

Johnson's Carbon Remover puts new life in your engine. It cleans out carbon, stops knocking and pounding, gives more power on hills, improves the "pick-up" and restores the original "pep" and smoothness.

With proper carbon removal, you'll have better compression and less valve grinding, less ignition trouble and lower oil consumption. Johnson's Carbon Remover is easier, quicker, less expensive, and more effective than any other method — more effective because it is thorough and because you won't neglect to use it often after the first trial.

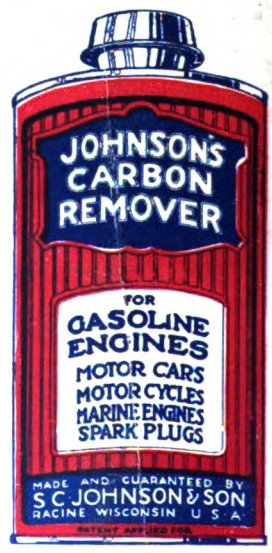
Do It Yourself—No Trouble

Simply pour an ounce of Johnson's Carbon Remover into each cylinder in the evening. Over night it soaks into the accumulated carbon and leaves it a soft inflammable mass. When you start your engine the next morning this mass burns, pulverizes and is blown out with the exhaust in powder form.

S. C. JOHNSON & SON, Dept. ADR3, RACINE, WIS.

Pints.....$1.00
Half-pints.... .65

If your dealer cannot supply you, order direct and we will prepay the express to any point in the U. S. A. east of the Rockies.



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SPRING TRADE SPECIAL NUMBER

Automobile Dealer and Repairer

A JOURNAL OF PRACTICAL MOTORING

THE MOTOR VEHICLE PUBLISHING CO. 71-73 Murray Street—New York

Vol. 25, No. 2 NEW YORK, APRIL, 1918 Monthly, $1.00 per year Single Copy 10 Cents

Buyer's Guide and Index to Advertisements, Pages 5, 75 and 80 — Table of Contents will be found on Page 3

TAKE THE HILLS ON HIGH

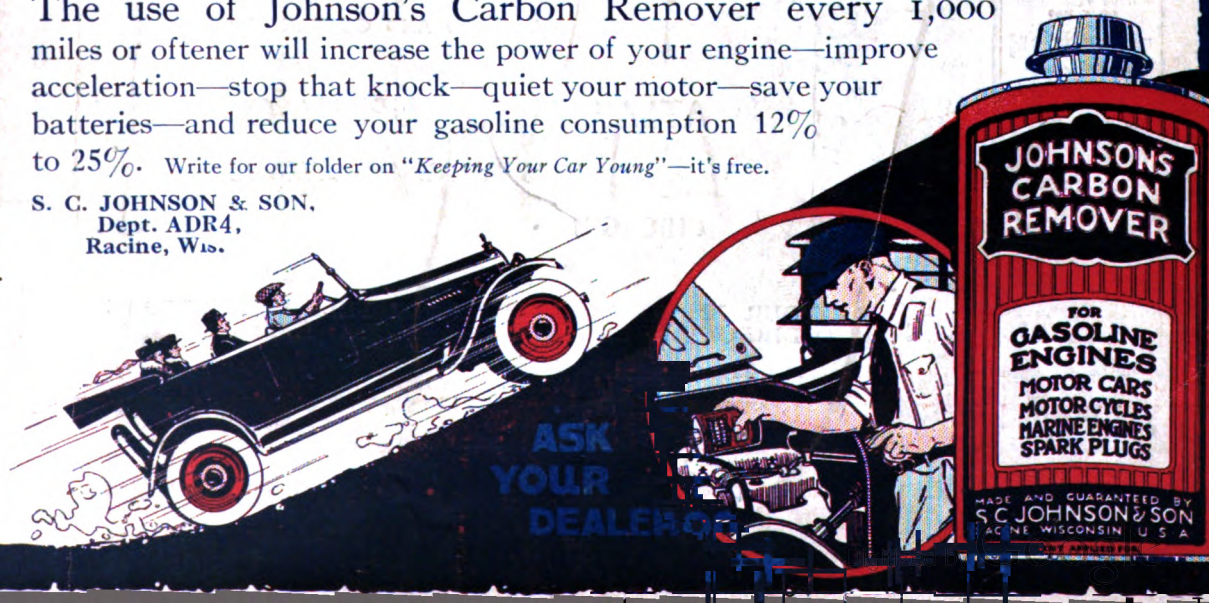
WHEN your automobile limps up hills, knocking in protest at climbing them "on high"—it is a sure indication of carbon. The easiest, cleanest, safest and most satisfactory method of removing carbon deposits is with Johnson's Carbon Remover. It will save you $3.00 to $5.00 over any other method, without laying up your car. No time or labor required—you can do it yourself in five minutes.

JOHNSON'S CARBON REMOVER

This is a harmless liquid. It contains no acid and does not affect lubrication in any way or interfere with the oil in the crank case. It has no action on any metal.

The use of Johnson's Carbon Remover every 1,000 miles or oftener will increase the power of your engine—improve acceleration—stop that knock—quiet your motor—save your batteries—and reduce your gasoline consumption 12% to 25%. Write for our folder on "*Keeping Your Car Young*"—it's free.

S. C. JOHNSON & SON,
Dept. ADR4,
Racine, Wis.



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TIRE-DOH

The World's Standard Rubber Repair Outfit

REPAIRS CASINGS AND INNER TUBES

OR ANYTHING MADE OF RUBBER

SIMPLE—EASY—QUICK—PERMANENT

NO HEAT NO TOOLS

MILLIONS OF SATISFIED USERS



$1.00 OUTFIT—ENOUGH FOR 75 REPAIRS
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FOR SALE BY 10,000 GOOD DEALERS

MANUFACTURED AND GUARANTEED BY

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616 W. AUSTIN AVENUE

CHICAGO, U. S. A.

DEALERS: ASK YOUR JOBBER'S SALESMAN FOR FULL PARTICULARS
SEND DIRECT TO US FOR NEW SELLING HELPS

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Automobile Dealer and Repairer

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THE MOTOR VEHICLE PUBLISHING CO. 71-73 Murray Street—New York

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THE easiest and quickest way of repairing leaks in radiators, pumps, water jackets, hose connections, etc., is to use Johnson's Radiator Cement. This will stop the leaks instantly without laying up the car. No mechanical experience is required—all you have to do is remove the cap and pour the liquid into the radiator.

Quick—Efficient—Harmless

Johnson's Radiator Cement blends perfectly with the water until it reaches the leaks—just as soon as it comes in contact with the air it forms a hard, tough, pressure-resisting substance which is insoluble in water and consequently makes a permanent seal.

Johnson's Radiator Cement contains nothing which can coat or clog the cooling system. It will seal leaks in from two to ten minutes.

Quarts $1.75 Pints $1.00 Half-pints 65c

If your dealer cannot supply you, send us $1.00 and we will forward you a pint all charges prepaid.

Write for our folder on *"Keeping Your Car Young"* —it's free.

S. C. JOHNSON & SON, Dept. ADR-5, Racine, Wis.





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means the use of

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TIRE-DOH

Because it's

ECONOMICAL TWO CENTS' WORTH REPAIRS THE AVERAGE PUNCTURE

EASY TO USE NO HEAT OR TOOLS NEEDED— USE AT HOME OR ON THE ROAD

PERMANENT NEVER LEAK OR LOOSEN— OUTLASTS LIFE OF TUBE

Satisfy the National Demand



Place your order with your jobber—get the new, hermetically sealed Tire-Doh Outfits.

GOOD PROFIT

50c Size **$1.00 Size**

ASK US FOR NEW SELLING HELPS

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THE MOTOR VEHICLE PUBLISHING CO. 71-73 Murray Street—New York

Vol. 25, No. 4 NEW YORK, JUNE, 1918 Monthly, $1.00 per year Single Copy 10 Cents

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More Mileage for Tubes and Casings

HERE, at last, is a quick and permanent repair for tubes, casings and all rubber goods. With it the most inexperienced motorist can satisfactorily and inexpensively repair his own tubes. No time, labor or heat required. The Patch can be applied in ten minutes—at a cost of 2c—and it's so simple a child can use it.

JOHNSON'S HASTEE PATCH

is much more satisfactory than vulcanizing because there is no danger of burning and spoiling the tube. It gives equally good results on a pin hole puncture or on a large blow out. Is conveniently put up in strips so the user can cut just the right size patch for each particular break.

Johnson's Hastee Patch is filling a long-felt-want for patching rubber boots, hose, hot water bottles, rubbers, rubber coats, bath sprays, auto tops, etc. Don't throw away rubber goods when they spring the first leaks—make them do double service—repair them yourself with Johnson's Hastee Patch.

USE COUPON FOR TRIAL PACKAGE—SATISFACTION GUARANTEED OR YOUR MONEY BACK



S. C. JOHNSON & SON, Dept. ADR, Racine, Wis.

I enclose 50c for which please send me by prepaid P Post a strip of Johnson's Hastee Patch from which 25 ave size patches may be cut. Satisfaction guaranteed or money back.

Name .....

Address .....

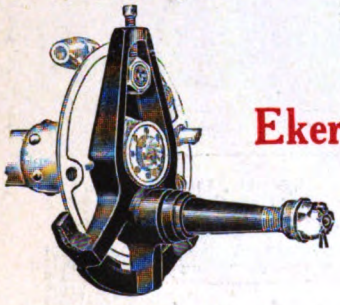
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PARO'S DEVICES



Emergency Axle No. 2

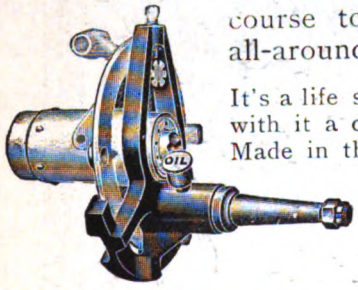


Emergency Axle No. 1

Ekern's Emergency Axle Stubs

FOR FORD CARS AND OTHER CARS

Tom recommends the emergency axle to Dick and Dick tells Harry and Harry carries the good news along the line, which helps of course to make this idea a dandy good all-around seller.



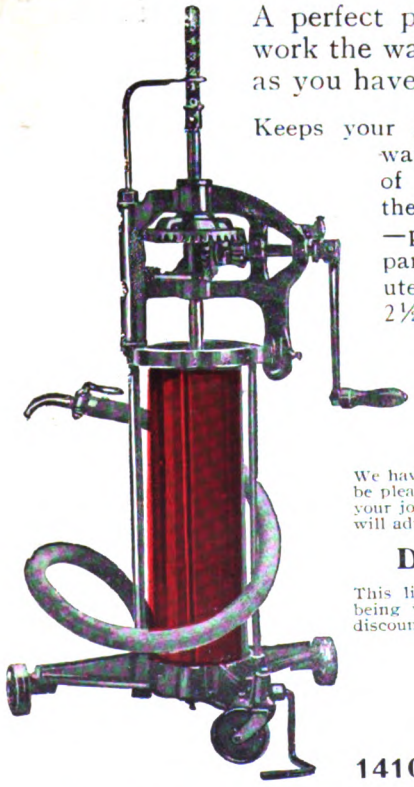
Emergency Axle No. 3

It's a life saver to the tourist with a broken axle—with it a car can be placed on its own wheels. Made in three types.

LIST PRICES

No. 1, for Fords . . .	**$5.00**
No. 3, " " . . .	**6.00**
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EKERN'S PORTABLE GREASE GUN



Model K Grease Gun

A perfect piece of mechanism that will work the way you want it to work as long as you have a use for it.

Keeps your grease off the floor and prevents waste. Registers the exact amount of grease sold to a customer—save their cost in a very short time. Handy—portable—can be removed to any part of the shop. Refilled in a minute. Holds 20 pounds of grease or 2½ gallons of oil.

Don't experiment—get a good Grease Gun while you're about it.

This gun is overwhelmingly favored because it's unqualifiedly guaranteed.

We have many other practical shop devices and would be pleased to have you write to us for full details. If your jobber does not handle them, let us know and we will advise you who does.

DEALERS AND JOBBERS

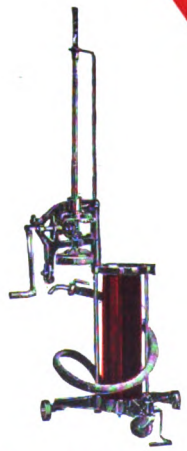
This line is the biggest seller in the market and is being widely advertised. Write for special attractive discounts, today.

H. G. Paro Co.

Dept. M

1410-12-14 So. Michigan Boulevard

CHICAGO, ILL.



Open for Refilling

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Buyer's Guide and Index to Advertisements, Pages 81, 82 and 83 Table of Contents will be found on Page 112

CHICAGO SHOW NUMBER

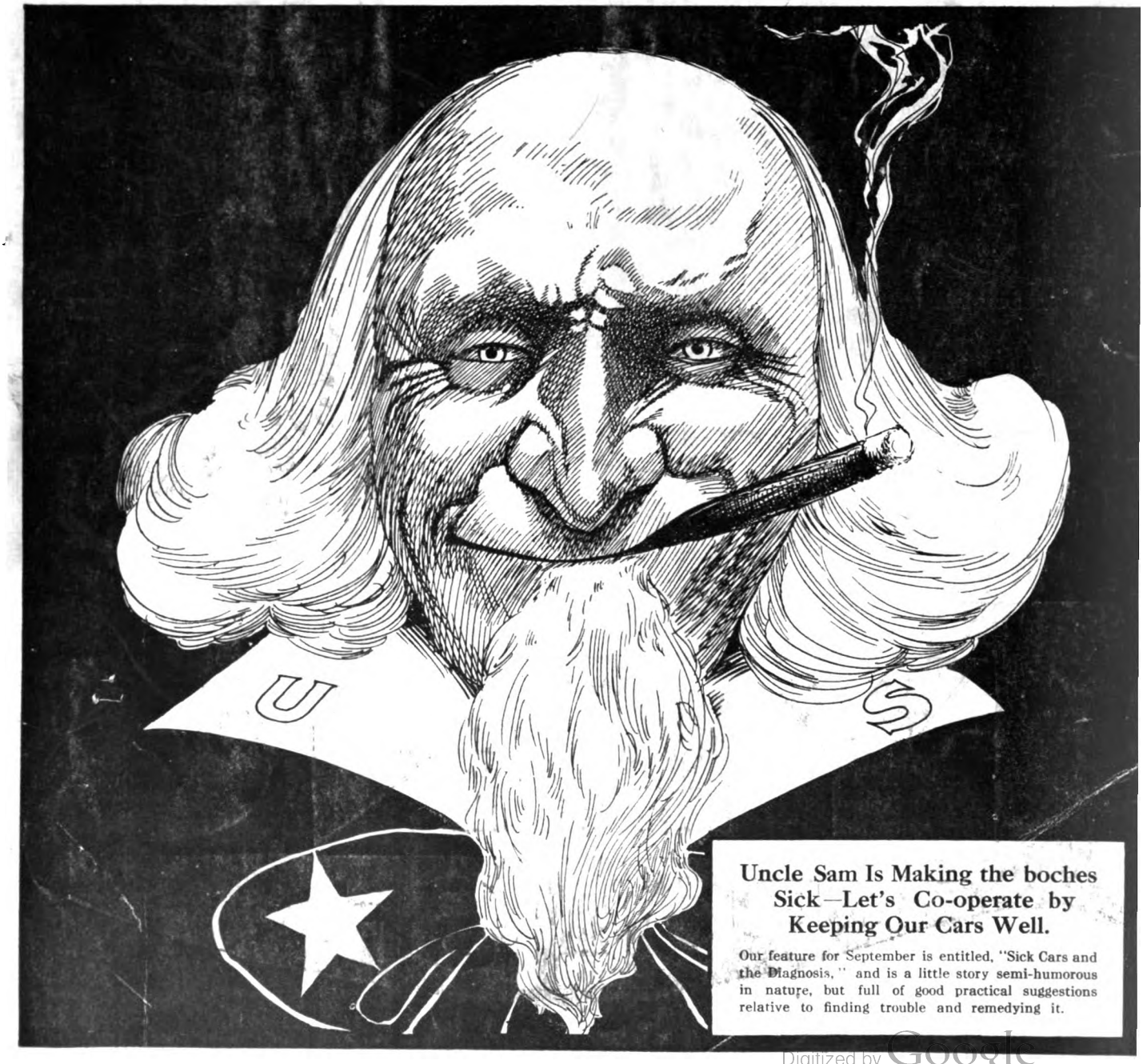
This Magazine is represented at Space 9 A, Automotive and Accessories Exposition of Trucks, Tractors and Accessories, Municipal Pier, Chicago, September 14-21, 1918.

Automobile Dealer and Repairer

A JOURNAL OF PRACTICAL MOTORING

THE MOTOR VEHICLE PUBLISHING CO. 71-73 Murray Street-New York

Vol. 25, No. 6 NEW YORK, AUGUST, 1918 Monthly, $1.00 per year Single Copy 10 Cents



Uncle Sam Is Making the boches Sick—Let's Co-operate by Keeping Our Cars Well.

Our feature for September is entitled, "Sick Cars and the Diagnosis," and is a little story semi-humorous in nature, but full of good practical suggestions relative to finding trouble and remedying it.

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Simply moisten a piece of cheesecloth with a few drops of Lyknu by applying cloth to mouth of bottle. Do not pour!



Go lightly over surface to be polished with dampened end of cloth. Then, rub with same cloth until surface is dry

The Right Way to Use Lyknu

The "One-Cloth" Polish

Coating a car with a film of oil, grease or gum is not polishing it.

Depending upon elbow-grease—and lots of it—to get a clean, shining result—is a waste of time and energy.

The logical way to polish a car is to use Lyknu—and to use it correctly in order to get best results quickly, easily and economically.

Lyknu adds nothing to the car but a polish—no grease, no oil, no gum, no coating of any kind.

It *cleans* and polishes at one easy operation, removing all accumulation, and restoring the automobile's first, fine appearance—*just like new*.

With Lyknu, you don't have to rub laboriously to produce a polish. You rub *only* until surface is dry. Only one cloth needed; only one easy operation.

Lyknu is the economy-polish as well as the quality-polish. It goes three times as far because its spreading quality is three times as great.

Try Lyknu on your own car! If you are a dealer, write on your business letterhead for a 50 cent bottle of Lyknu which will be sent prepaid with our compliments

Lyknu Polish Manufacturing Co. Pittsburgh, Pa.



LYKNU POLISH

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DEC 31 1918

WINTER EQUIPMENT NUMBER

Automobile Dealer and Repairer

A JOURNAL OF PRACTICAL MOTORING

THE MOTOR VEHICLE PUBLISHING CO. 71-73 Murray Street—New York

Entered as Second-Class Matter August 3, 1907, at the Post Office at New York, N. Y., under the Act of March 3, 1879.

Vol. 26, No. 2 NEW YORK, OCTOBER, 1918 Monthly, $1.00 per year Single Copy 10 Cents



Buyer's Guide and Index to Advertisements, Pages 79, 80 and 81 Table of Contents will be found on Page 164

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$3 per set of three
West of Rockies, $3.25

Outwears Several Sets of Ordinary Linings

Easy to identify by
(1) the name
(2) the red box

Be sure to get the genuine CORK INSERT

Makes Any Ford Work Smoother

With Cork Insert Lining in the transmission, a Ford gets away quicker, smoother, quieter—it's a real *smile*-bringer. Under the brake it *glides* to a quiet stop. If the Ford owner's wife has been used to putting the coffee on when she hears him stopping, she'll have to make different arrangements. She won't hear him.

Cork Insert *doesn't chatter* like ordinary lining does—for it doesn't grab and slip—the cause of the vigorous vibration and the noise.

Lasts So Long It's Cheapest in the Long Run

Cork Insert is not only the *most efficient* but also the *most economical* lining to use. It outwears several sets of ordinary linings. Saves the expense of frequent replacements—saves the wear and tear of racking vibration—saves the continual repairing of the rear end—prolongs the life of the car.

You can get Cork Insert at your garageman's or auto supply dealer's. If out, they can quickly get it, for *all jobbers handle it.* Insist on the genuine.

Advance Automobile Accessories Corporation, Dept. K5-1, 56 E. Randolph St., Chicago

Makers also of Cork Insert Brake Lining for all cars—Oil-Proof—Slip-Proof—Squeak-Proof

A No-Stretch Fan Belt for Fords that Doesn't Stretch

Cork Insert doesn't slip as ordinary fan belts do—a slippage that runs as high as 50% to 75%. It keeps the engine cool by keeping the fan fanning. Gives exceedingly long wear.

$1.00 for 1917-18 Fords—
85c for 1916 and earlier models

Convenient Order Blank

Advance Automobile Accessories Corp.,
Dept. K 5-1, 56 E. Randolph St., Chicago

Enclosed find $..... Send me:

[ ] 1 set Cork Insert Transmission Linings for Fords ($3 enclosed)
[ ] 1 Cork Insert Fan Belt for 1917-18 Ford ($1 enclosed)
[ ] 1 Cork Insert Fan Belt for 1916 or earlier Ford. (85c enclosed)

Name.....

City..... State.....

Dealer's Name.....

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CHRISTMAS NUMBER

Automobile Dealer and Repairer

A JOURNAL OF PRACTICAL MOTORING

THE MOTOR VEHICLE PUBLISHING CO. 71-73 Murray Street-New York

Entered as Second-Class Matter August 3, 1907, at the Post Office at New York, N. Y., under the Act of March 3, 1879.

Vol. 26, No. 3 NEW YORK, NOVEMBER, 1918 Monthly $1.00 per year Single Copy 10 Cents



Uncle Sam: That's right, Santa, give 'em useful presents this year.

Buyer's Guide and Index to Advertisements, Pages 70, 71 and 72 Table of Contents will be found on Page 100

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This Low Priced Sensible Christmas Gift



$5

THE VICTOR HEATER FOR FORDS

Is The One That Sells On Sight!

When you want heat in a car you want it INSTANTLY. And with the VICTOR FRESH AIR HEATER you get heat within thirty seconds after the motor starts. The Victor Fresh Air Heater is connected directly to the motor without the use of troublesome tubing. It weighs less than three pounds. Costs nothing to operate. You'll never know how much comfortable usefulness you can get out of your Ford car all Winter until you equip with a Victor Fresh Air Heater.

You couldn't buy a more EFFICIENT heater at any price for touring car, town car or sedan—$5.00 buys it. Twenty minutes work installs it. You can do it yourself—EASILY.

GET THE VICTOR NOW—AND RIDE IN WARMTH AND COMFORT—GET ONE FOR YOUR FRIEND, TOO—IT'S A SPLENDID USEFUL CHRISTMAS GIFT. Ask your dealer. If he doesn't yet carry it—write.

To Dealers—Over 210,000 Victors in Use

The heater business is now on in earnest, with four months still to go. With the Victor Fresh Air Heater you can get your full share of these profits.

Remember that the Victor is the only scientifically constructed Ford Heater that heats FRESH AIR DIRECT—NOT METAL. You hand out a Victor like any other package accessory and are never troubled with service problems. Thousands of dollars are being spent right at this moment in advertising the Victor—thousands have been sold—and thousands more will be sold—"get yours"—use the coupon.

If you don't use the coupon—write your jobber or direct to us.

FOREIGN AND DOMESTIC AUTO SUPPLY CO.
1743 BROADWAY, NEW YORK, N. Y., U. S. A.

Did you get your allotment?
If not—cut out this coupon and send it in today.

Cut Here

FOREIGN AND DOMESTIC AUTO SUPPLY CO.
1743 Broadway, New York. A.D.R.

Please send me full details in regard to prices, dealer helps etc., concerning the Victor Heater for Ford cars.

Dealer's Name .....

Street Address .....

City ..... State .....

Jobber's Name .....



This illustration shows the Victor Heater for Fords in place. Note that it rests flush with the floor boards.

JAN 3 1919

Automobile Dealer and Repairer

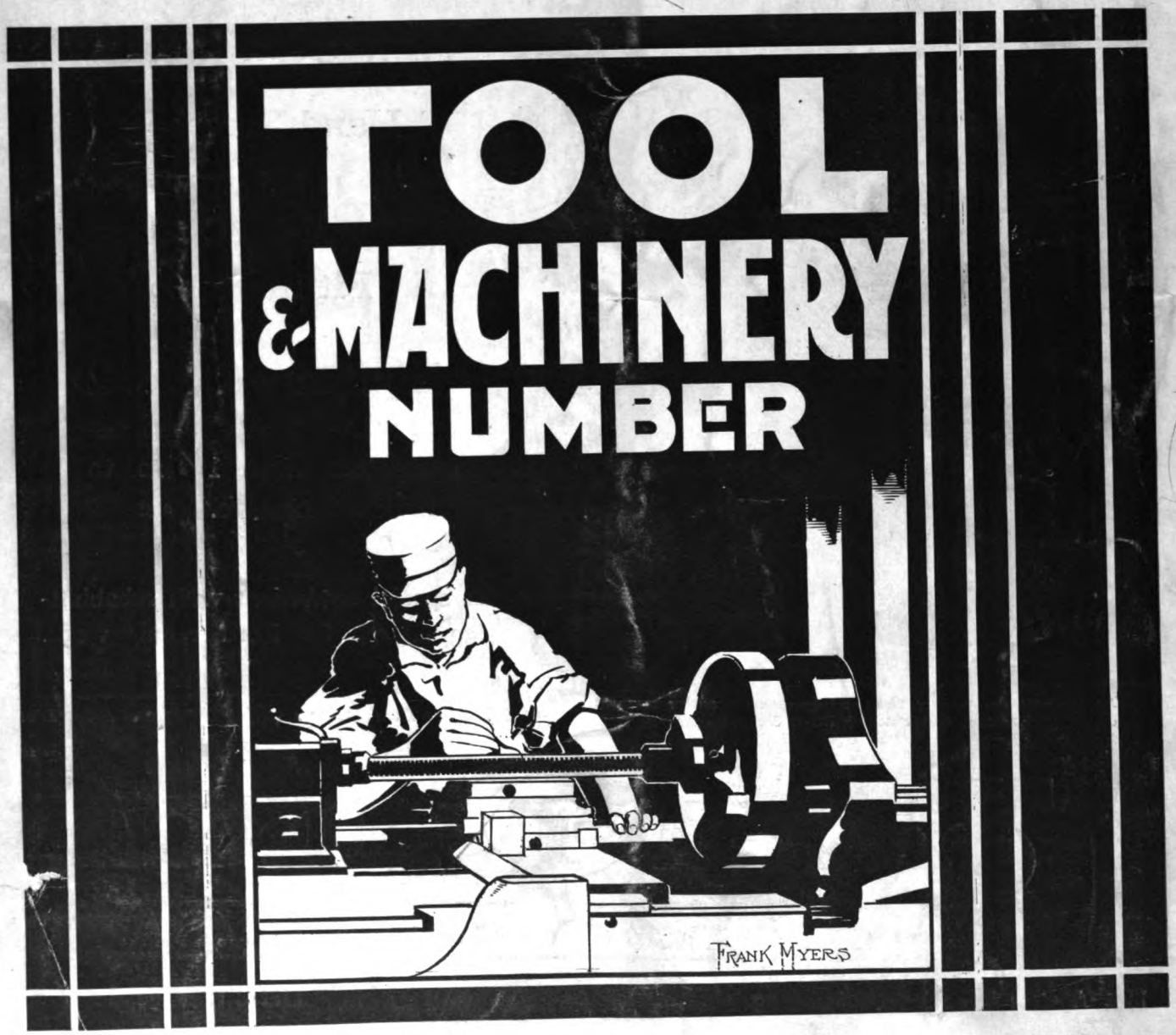
A JOURNAL OF PRACTICAL MOTORING

THE MOTOR VEHICLE PUBLISHING CO. 71-73 Murray Street—New York

Entered as Second-Class Matter August 3, 1907, at the Post Office at New York, N. Y., under the Act of March 3, 1879.

Vol. 26, No. 4 NEW YORK, DECEMBER, 1918 Monthly, $1.00 per year Single Copy 10 Cents

TOOL & MACHINERY NUMBER



Buyer's Guide and Index to Advertisements, Pages 78, 79 and 80 Table of Contents will be found on Page 112

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Main Bearing Aligning Reamers

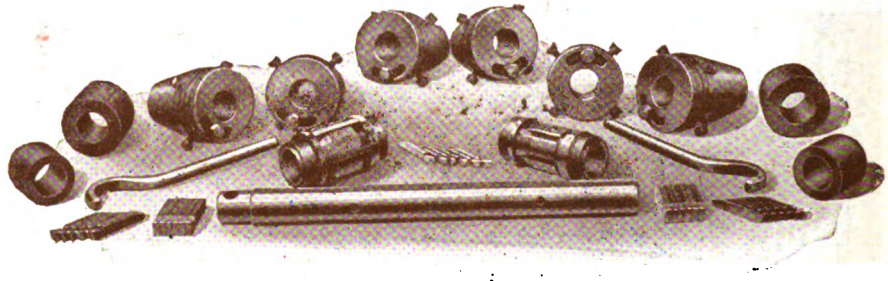
The Martell System for Garage and Repair Stations

Insures—

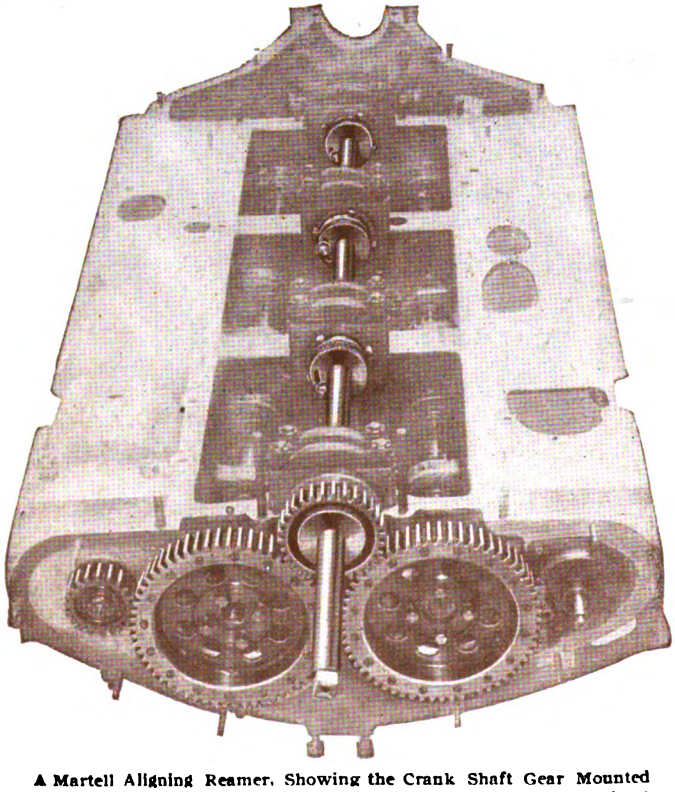
Perfect alignment through all bearings—

Correct position of shaft in relation to other shafts or parts depending upon it for motion—

Correct size of bore of bearings allowing for oil clearance.



A Complete Martell Aligning Reamer No. 2 Ready for Shipment. The Reamer Shaft is not shown but is furnished.



A Martell Aligning Reamer, Showing the Crank Shaft Gear Mounted on a Special Bushing on the Reamer Bar to Secure Proper Gear Mesh.

Eliminates

Hand Scraping.

Reduces

Fitting 90%

Equipment No. 2

provides a range in diameters from 1⅝ in. to 2½ in. inclusive.

A special equipment with rebabbitting fixture for Ford repair work.

Write for Descriptive Booklet 101-H and Price List

TAFT-PEIRCE

Woonsocket, R.I., U.S.A.

New York: Woolworth Building

Detroit: Majestic Building

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JUN 4 1919

BOSTON SHOW NUMBER

This Magazine is represented at Space 516, Department F, Boston Automobile Show, March 15–22, 1919

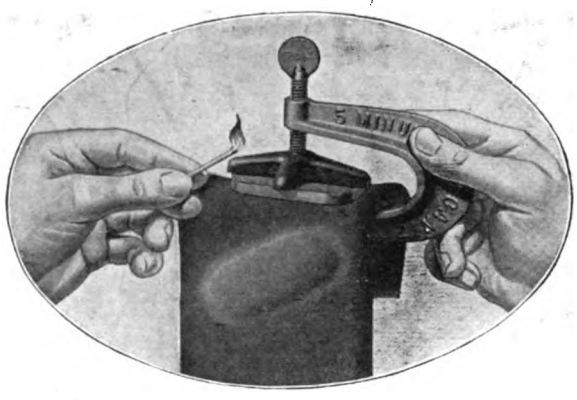
Automobile Dealer and Repairer

A JOURNAL OF PRACTICAL MOTORING

THE MOTOR VEHICLE PUBLISHING CO. 71–73 Murray Street–New York

Entered as Second-Class Matter August 3, 1907, at the Post Office at New York, N. Y., under the Act of March 3, 1879.

Vol. 26, No. 6 NEW YORK, FEBRUARY, 1919 Monthly, $1.00 per year Single Copy 10 Cents



A Million Motorists Use It

The limited supply and increasing cost of inner tubes make it necessary for motorists to repair punctures, cuts, tears and cracks—to keep their tubes in good repair—as good as new.

Present conditions make it imperative for motorists to stop the easy-going, wasteful habit of carrying $5 to $15 worth of spare tubes—that deteriorate quickly—and scrapping perfectly good inner tubes that merely have a puncture, cut or tear—which can be repaired *permanently* with a Shaler 5-Minute Vulcanizer, quicker than a new tube can be inserted.

Saves Tubes — Saves Repair Bills

You can repair your own tubes—as good as new. It's easy and inexpensive. *The Shaler works automatically* —and without fail. Just touch a match to the non-flaming chemical fuel. In five minutes you have a firm, flat, "feather-edge," permanent repair—stronger than any "stuck on patch"—stronger that the tube itself. No gasoline, cement or flame, and no danger of injuring the tube. Carry it in your tool box for emergency use. It works in the wind, in any weather, anywhere. The heat is applied directly to the pure gum patch and does not extend to the tube itself.

Complete With 12 Patch and Heat Units $1.50

The outfit includes the Vulcanizer—12 Patch & Heat Units (6 round for punctures, and 6 oblong for cuts)—complete, $1.50. Extra Patch & Heat Units 75c per dozen.

Sold by All Accessory Dealers and Jobbers

TO DEALERS—To insure shipments—it is advisable to order from your jobber now. The great demand has exceeded our factory capacity, and shipments will be made according to priority in receipt of orders

Catalog of the Complete Shaler Line of Vulcanizers for Motorists, Repair Shops and Garages mailed on request.

C. A. Shaler, 801 Fourth St., Waupun, Wis.

Oldest and Largest Manufacturers of Vulcanizers



Mends Tubes in 5 Minutes

Buyer's Guide and Index to Advertisements, Pages 73, 74 and 75 Table of Contents will be found on Page 104

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"Defies Time and the Elements"



CHASE DREDNAUT Motor Topping

TOPPING material that will fulfill your greatest expectations — Drednaut Motor Topping adds to the beauty of any car.

QUALITY topping through and through—made to give the maximum of service—uniform in strength and finish.

Chase Drednaut Motor Topping (now over twenty-five years on the market) is positively weatherproof in every detail—protection from the severest of storms or the hottest suns—the top material that *"defies time and the elements"* and which often outlasts the life of the car itself. Easily cleansed, always attractive, economical.

AN OPPORTUNE TIME TO RE-TOP. The biggest step towards the rejuvenation of old cars is accomplished when a stunning new top of Drednaut is substituted for that rusty-looking, probably torn, old top. Now is the time to retop and bring cars up to the scratch. Dealers everywhere will furnish you with Chase Drednaut if you so specify.

Chase Drednaut retains its wonderful rich appearance over a long period of severe use.

Don't experiment with inferior materials — make sure by using genuine Chase Drednaut.

Products of our Mills:

Robes, Steamer Rugs
Slip Cover Material

L. C. CHASE & CO., BOSTON

NEW YORK DETROIT CHICAGO
SAN FRANCISCO

Leaders in Manufacturing Since 1847

Products of our Mills:

Leatherwove
Mohair Velvets

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Rolling right along.

3,000,000 now in use

In both standing and sales, the Inland Piston Ring is fast taking front rank the world over, because it *solved* the problem of making a *one-piece* ring *completely* gas-tight.

The Inland Spiral Cut principle is an exclusive Inland patent—its advantages cannot be duplicated in any other piston ring at any price.

As a mechanically perfect piston ring, the Inland is emphatically the best piston ring proposition for both dealers and engine owners.

Merit, plus advertising on the broadest scale, has made Inland sales grow by leaps. Sales are now on a basis of *millions per annum.*

Inland Machine Works,
802 Mound St., St. Louis, Mo., U. S. A.

Jobbers everywhere stock Inlands.

INLAND



1 PIECE PISTON RING

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Stop those Leaks



THE easiest and quickest way of repairing leaks in radiators, pumps, water jackets, hose connections, etc., is to use Johnson's Radiator Cement. This will stop the leaks instantly without laying up the car. No mechanical experience is required—all your have to do is remove the cap and pour the liquid into the radiator.

JOHNSON'S RADIATOR CEMENT

Johnson's Radiator Cement blends perfectly with the water until it reaches the leaks—just as soon as it comes in contact with the air it forms a hard, tough, pressure-resisting substance which is insoluble in water and consequently makes a permanent seal.

Quick—Efficient—Harmless

Johnson's Radiator Cement contains nothing which can coat or clog the cooling system. It will seal leaks in from two to ten minutes.

Quarts, $1.75. Pints, $1.00. Half-pints, 65c.

If your dealer cannot supply you, send us $1.00 and we will forward you a pint, all charges prepaid.

WRITE FOR OUR FOLDER ON
"Keeping Your Car Young"—It's free.

S. C. JOHNSON & SON, Dept. A.D.R.2, Racine, Wis.



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